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ABSTRACT

This is a catalog of performance objectives and criterion measures covering algebra I, algebra II, geometry, and trigonometry for students planning to take technical mathematics at a junior college. Broad objectives, specific objectives, and criterion referenced test items are presented by skill and knowledge areas within each of the four courses mentioned. An accuracy level of 70 percent on the criterion measures is suggested. (LS)

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PERFORMANCE OBJECTIVES

and

CRITERION REFERENCED TEST ITEMS

for

MATHEMATICS

Duval County School Board
Pre-Technical Curriculum Project
ESEA Title III
June, 1973

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FOREWORD

This is a course catalog of Performance Objectives and Criterion-Referenced Test Items for MATHEMATICS. It was developed as part of an ESEA Title III Federal Grant to develop a Pre-Technical Curriculum component for the Duval County School System.

INTRODUCTION

This course catalog was developed to aid the instructor in teaching the skills and knowledges needed by those students planning to take Technical Mathematics at a Junior College.

The performance objectives listed for each course represent only the minimum level of competency required of the student for successful performance at the junior college level. Additional material may be covered at the direction of the individual instructor.

This course catalog was developed as a field test model to be piloted during the 1973-74 school year. There will be an ongoing evaluation during the year and any recommendations by you will be welcomed.

DEFINITIONS

The format of the catalog uses the following terms.

1. Terminal Performance Objective - These objective refer to a behavior, knowledge, or skill that a student should demonstrate at the end of a particular unit or section. They are written in broad terms.

2. Intermediate Performance Objectives - These objectives refer to a behavior, knowledge, or skill that a student should demonstrate along the way towards mastery of the terminal performance objective. They are written in specific terms.

3. Criterion Measures - These are criterion referenced test items which evaluate whether the student has met the objective.

4. Skill/Knowledge Based On: These are descriptors which are coded to specific skills and knowledges previously identified in Task and Skill Analysis Reports conducted by the project staff.

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Performance Objectives & CRT Items in

1. Algebra I
2. Algebra II
3. Geometry
4. Trigonometry

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Algebraic terms and symbols

T.P.O. The student will answer questions relating to algebraic terms and symbols, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Given sentences, the student will identify those sentences which are statements and tell which are true.	1.1.1	Which of the sentences below are statements? Of those that are statements, tell which are true. 1. $9 \times 0 \neq 9$ 2. Multiply -2 by 8 3. $2 < 4 < 3$ 4. $19 \times 81 \leq 81 \times 19$
1.2	The student will simplify numerical expressions by correctly applying the use of symbols of inclusion and order of operation.	1.2.1	Simplify each expression: 1. $[6 - (4 \div 2)] \times 3$ 2. $6 - 4 \div 2 \times 3$ 3. $13(13 - 9) - 9(13 - 9)$ 4. $48 \div 6 + 2 \times 5$
1.3	The student will translate word phrases and word sentences into mathematical expressions and mathematical sentences. He will also translate mathematical expressions into word phrases.	1.3.1	Translate each word sentence into a mathematical sentence: 1. Three times y equals thirty-six. 2. Eight is one less than the product of three and x. 3. The quotient of v and 7, decreased by 5, is 1. 4. The sum of twice m and seven is twenty-three.

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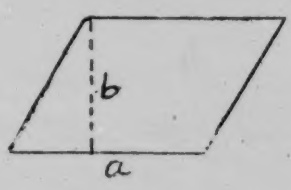
COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Algebraic terms and symbols

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.3	Cont'd	1.3.1	Translate each expression into a word phrase: 1. $5s$ 2. $7 + s^2$ 3. $(s + t)^2$ 4. $\frac{r + t}{s}$
1.4	The student will evaluate the variable in the left member of formulas for the given values of the other variables.	1.4.1	Evaluate the variable in the left member of each formula for the given value(s) of the other variable(s). 1. Area of parallelogram: $A = ab$  a: 7 (in.) b: $11\frac{1}{2}$ (in.)

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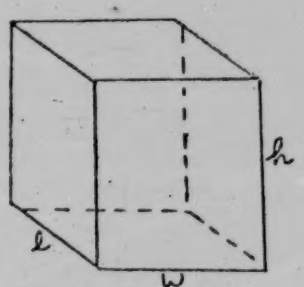
COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Algebraic terms and symbols

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.4	Cont'd	1.4.1	2. Volume of a rectangular solid: $V = lwh$  l: 3.5 (ft.) w: 4 (ft.) h: 7.8 (ft.) 3. Energy in ergs equivalent to a given mass: $E = mc^2$ m: 1.06 (gm.) c = 30,000,000,000 (cm. per sec.) 4. Distance in centimeters traveled by a free falling body: $s = \frac{1}{2}gt^2$ g = 980.665 (cm. per sec.) t: 2.5 (sec.)

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Properties of real numbers

T.P.O. Given a non-empty set of real numbers together with defined operations, the student will demonstrate his knowledge of the properties of real numbers, equality, and inequality by naming the properties illustrated by given statements, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	The student will name the property of real numbers illustrated by each given statement.	2.1.1	Name the property of real numbers illustrated by each of the following: 1. $3 + 5 = 5 + 3$ 2. $6 \cdot 4$ is a real number. 3. For all real numbers r and s, $5(rs) = (5r)s$. 4. $7 + (3 + 0) = (7 + 3) + 0$ 5. $\frac{1}{2} \cdot 6 = 6 \cdot \frac{1}{2}$
2.2	The student will name the property of equality or inequality which supports indicated conclusions.	2.2.1	Name the property of equality or inequality illustrated by each of the following: 1. If x denotes a real number and $x + 3 = 0$, then $0 = x + 3$. 2. $2 + 5 = 5 + 2$ 3. If y denotes a real number, and if $y + 3 = 7 + 2$ and $7 + 2 = 9$, then $y + 3 = 9$. 4. If x denotes a real number and $x > 5$, then $x + 2 > 5 + 2$. 5. If y denotes a real number and $y < 2$, then $3y < 3 \cdot 2$.

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Operations on real numbers

T.P.O. The student will complete operations on real numbers by simplifying given numerical expressions, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	The student will complete addition and subtraction on real numbers by simplifying given numerical expressions.	3.1.1	Simplify: 1. $251 - (-312)$ 2. $-16 + 31 - 12 - 25$ 3. $-(37 - 46) - (53 - 78)$ 4. $0 - \frac{1}{2}$ 5. $-764 - 368$
3.2	The student will complete multiplication and division of real numbers by simplifying given numerical expressions.	3.2.1	Simplify: 1. $(-56) \div 13$ 2. $(-\frac{1}{8})(96)(\frac{1}{4})$ 3. $(-\frac{5}{8}) \div (-\frac{1}{2})$ 4. $(-48 \div 3) \div [-3(-2)]$ 5. $\frac{-196 \div (-49)}{-1 \div 7}$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Solving equations with one variable

T.P.O. Given linear, quadratic, and radical equations in one variable, the student will find the solution set to each, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	The student will find the solution set to given linear equations.	4.1.1	Solve. The domain of each variable is the set of real numbers. 1. $17 = 3x + 2$ 2. $4y = -(18 - y)$ 3. $11x = 5x - 12$ 4. $x + 4 = x - 4$ 5. $\frac{u}{.01} + 1 = \frac{2}{.01}$
4.2	Given quadratic equations of the form $ax^2 + bx + c = 0$, the student will find the solution sets by factoring, completing the square, or quadratic formula.	4.2.1	Find the solution set of each equation over the set of real numbers: 1. $(2x - 8)(x + 5) = 0$ 2. $2n^2 + 5n = 3$ 3. $x + 1 + \frac{1}{x + 1} = 2\frac{1}{2}$ 4. $x^2 + 6x - 8 = 0$ 5. $5x - x^2 - 3 = 0$
4.3	Given radical equations in one variable, the student will find the solution sets.	4.3.1	Find the solution set of each equation over the set of real numbers. 1. $\sqrt{2x + 3} = 9$ 2. $\sqrt{2y} + \sqrt{50} = \sqrt{8y} + \sqrt{18}$ 3. $(\sqrt{x + 1} - 4)(\sqrt{x + 2} + 1) = 0$

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Solving equations with one variable

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.4	The student will solve verbal problems involving linear, quadratic, and radical equations in one variable.	4.4.1	Solve each of the following problems: 1. Water is a compound made up of eight parts by weight of oxygen and one part by weight of hydrogen. How many grams of hydrogen are there in 207 grams of water? 2. The height h in feet that an object is above ground t seconds after being propelled vertically upward with an initial velocity of r feet per second is given by the formula: $h = rt - 16t^2$ Determine in how many seconds an object propelled vertically with an initial velocity of 128 feet per second will be 112 feet above the ground. 3. One data processing machine takes one hour longer than a second more modern machine to process a given supply of cards. On one occasion all the cards were processed by using the faster machine for one hour and the slower machine for 2 hours and 40 minutes. Find the time it would take each machine to process all the cards alone.

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Solving equations with one variable

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.4	Cont'd	4.4.1	4. The diameter of a circle in terms of its area is: $d = \frac{\sqrt{4\pi A}}{\pi}$ Solve for A in terms of d, and find the area of a circle whose diameter is .14.
			5. The thickness (in inches) of a horizontal beam, of rectangular cross section and fixed width and length, in terms of the weight (in pounds) which can be supported by the beam is: $t = \frac{1}{5}\sqrt{\frac{W}{6}}$ Find the weight which a 6-inch beam can support.

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Solving inequalities in one variable

T.P.O. Given inequalities in one variable, the student will find the solution sets, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	Given linear inequalities, the student will apply appropriate properties of inequality to find the solution sets and show each by graph.	5.1.1	Specify each of the following solutions by graph. The domain of each variable is the set of real numbers. 1. $3x - 7 < 11$ 2. $4x + 3 \leq 2x - 5$ 3. $1 - 3n > 7$
5.2	Given a conjunction or disjunction of inequalities in one variable, the student will find and graph the solution set.	5.2.1	Specify the solution set of each of the following by graph. The domain of each variable is the set of real numbers: 1. $x - 2 > -3$ or $x - 3 < 0$ 2. $\{x: x \leq -2\} \cup \{x: x > 2\}$ 3. $\{2x - 3 < 7\}$ and $\{2 < 2x - 4\}$ 4. $\{x: x \geq -2\} \cap \{x: x \geq 0\}$ 5. $3 > -2 - 5x \geq -17$
5.3	The student will solve verbal problems involving inequalities in one variable.	5.3.1	Solve each of the following problems: 1. Find all sets of four consecutive positive integers such that the largest integer in the set is greater than twice the smallest integer in the set. 2. What is the greatest possible length of the side of a square whose perimeter is not more than 48 units?

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Absolute values

T.P.O. The student will demonstrate his knowledge of the use of absolute values in open sentences by finding the solution sets to these open sentences, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	Given problems of the form $\|ax + b\| = c$, where a, b, and c are rational, the student will graph the solution set for x over the set of reals.	6.1.1	Graph the solution set of each of the following over the set of reals: 1. $\|x - 3\| = 7$ 2. $\|1 + 2(x - 1)\| = 7$
6.2	Given problems of the form $\|ax + b\| < c$, where a, b, and c are rational, the student will graph the solution set for x over the set of reals.	6.2.1	Graph the solution set of each of the following over the set of reals: 1. $\|n\| < 2$ 2. $\|2 - s\| < 1$ 3. $\|t - 3\| < 5$
6.3	Given problems of the form $\|ax + b\| > c$, where a, b, and c are rational, the student will graph the solution set for x over the set of reals.	6.3.1	Graph the solution set of each of the following over the set of reals: 1. $\|m\| > 2$ 2. $\|3 - r\| > 4$ 3. $\|2p - 9\| > 1$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Simplifying polynomials

T.P.O. Given a pair of polynomials, the student will compute their sum, difference, product, and/or quotient. He will complete the criterion test with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	Given pairs of polynomial expressions, the student will add and/or subtract and express the sum and/or difference in simple form.	7.1.1	Simplify: 1. $(5a + 3b) - (2a + 4b) + (3a - 4b)$ 2. $(5a^2 - 2b^2 + 3c^2) + (2a^2 - 5b^2 - 3c^2)$ 3. $(-3p + 8q) - (p - 7q)$ 4. $-7(r^3 + rst - st^2) - 2(3rst - 2r^3 + st^2)$
7.2	Given appropriate pairs of polynomial expressions, the student will find their products.	7.2.1	Simplify: 1. $(x + 5)(x^2 - x + 2)$ 2. $2x(2x^2 + 3xy + y^2)$ 3. $(a + 5)(a - 3)$ 4. $(x - 3)(x^2 + 7x + 6) + 2(x - 4)$
7.3	Given binomial expressions, the student will square each expression correctly.	7.3.1	Simplify: 1. $(2x + 5)^2$ 2. $(3y - 7)^2$ 3. $(pq - 4)^2$ 4. $(a + 3b)^2$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Simplifying polynomials

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.4	Given appropriate pairs of polynomial expressions, the student will find their quotients.	7.4.1	Divide the first polynomial by the second. Assume that no denominator has zero as a value. 1. $7x - 21, 7$ 2 $a^5 - 5a^2 + 3a, a^4$ 3. $x^2 + 5x + 6, x + 2$ 4. $a^3 - 8, a - 2$ 5. $x^3 - y^3, x^2 + xy + y^2$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Radicals

T.P.O. The student will demonstrate a knowledge of working with radicals by simplifying sums and products of radical expressions, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	The student will tell from a given list of symbols representing real numbers, whether each is rational or irrational.	8.1.1	Tell whether the given symbol represents a rational or irrational number: 1. $\sqrt{3}$ 2. $-\sqrt{25}$ 3. 2π 4. $\sqrt{\frac{4}{9}}$ 5. $\frac{1}{\sqrt{2}}$ 6. $3.7\overline{5}$
8.2	The student will express given radicals in simplified form.	8.2.1	Assume that the domain of every variable is the set of positive real numbers. Simplify: 1. $\sqrt{32}$ 2. $3\sqrt{200}$ 3. $\sqrt{18a^3}$ 4. $\frac{\sqrt{10}}{\sqrt{2}}$ 5. $\sqrt{\frac{3}{5}}$ 6. $\frac{a}{\sqrt{2b}}$ 7. $\sqrt{(a+b)^3}$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Radicals

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.3	The student will find the sums and products of radical expressions and express each in simplified form.	8.3.1	Assume that the domain of every variable is the set of positive real numbers. Write each expression in simplified form. 1. $5\sqrt{7} + 2\sqrt{7}$ 2. $3\sqrt{2} - \sqrt{2}$ 3. $3\sqrt{3} + \sqrt{27}$ 4. $\sqrt{3}(2 + \sqrt{3})$ 5. $(1 + \sqrt{3})(5 - \sqrt{3})$ 6. $(x + 2\sqrt{3})^2$ 7. $\frac{2}{3 - \sqrt{2}}$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Scientific notation

T.P.O. The student will express given decimal numerals in scientific notation. He will also express numerals given in scientific notation in decimal form, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	The student will express given decimal numerals in scientific notation.	9.1.1	Write each of the following numerals in scientific notation: 1. 73.5 2. 81.9 3. 0.0176 4. 0.00802 5. 123,700
9.2	The student will write numerals given in scientific notation in decimal form.	9.2.1	Write each of the following numerals in decimal form: 1. 10^4 2. 1.23×10^3 3. 9.873×10^{-2} 4. 10^{-2} 5. 1.32×10^{-7}
9.3	The student will find the solutions to appropriate verbal problems and express the solutions in scientific notation.	9.3.1	1. Using at most one molecule of each of the 22 known amino acids, 3.9×10^{26} different kinds of protein molecules can be formed. How many million different protein molecules can be formed?

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Scientific notation

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.3	Cont'd	9.3.1	2. A steady current of 1 coulomb will deposit 3.294×10^{-4} grams of copper from a water solution of copper sulfate upon an object to be plated. How many grams will 850 coulombs deposit?

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Systems of equations and inequalities

T.P.O. Given systems of linear equations or inequalities, the student will find the solution sets of the systems, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.1	Given systems of linear equations in two variables, the student will state whether the system of equations has a solution set that is the empty set, an infinite set of ordered pairs, or a set containing exactly one ordered pair.	10.1 .1	State whether the graphs of the given equation are parallel lines, the same line, or intersecting lines. 1. $x + 2y = 7$ $x + 2y = -3$ 2. $x = 5$ $y = 6$ 3. $2x - 4y = 10$ $3x - 6y = 11$
10.2	Given systems of linear equations with two variables, the student will solve the simultaneous equation.	10.2 .1	Solve each of the following systems: 1. $y = 2x$ $x + y = 6$ 2. $x + 3y = 6$ $2x + 5y = 9$ 3. $3x + 4y = 22$ $5y - 37 = x$ 4. $2x + 5y = 21$ $x = y$
10.3	Given systems of linear inequalities in two variables, the student will graph the solutions sets.	10.3 .1	Graph each open sentence on a coordinate plane: 1. $y \geq 2$ $x > 3$ 2. $y > 3x$ $y < 1$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Systems of equations

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.3	Cont'd	10.3 .1	3. $y < x - 1$ $y \geq 2x - 2$ 4. $x > 0$ $y \geq x$ $y \leq x + 2$
10.4	The student will solve appropriate verbal problems by the use of systems of linear equations with two variables.	10.4 .1	1. With a tail wind, a jet plane flew 2400 miles in 4 hours, but it required 6 hours for the return trip against the wind. Find the airspeed of the plane and the wind speed. 2. An airline took in $3962.50 for a certain flight. It received $1562.50 more from tourist tickets at $42.50 each than it did from first-class tickets at $50 each. How many tickets of each kind were sold?
10.5	The student will solve appropriate verbal problems by the use of systems of inequalities (linear programming).	10.5 .1	1. A machine shop needs to manufacture at least 1920 bolts and 1700 screws. A small machine can make 80 bolts and 75 screws per hour. A larger machine can make 120 bolts and 100 screws per hour. The cost of running the small machine is $2 per hour, and of running the large machine is $3.10 per hour. How long should each machine be used for the most economical production?

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Factoring

T.P.O. Given an appropriate set of polynomials, the student will factor them completely, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	The student will determine the G.C.F. of given pairs of monomial expressions.	11.1 .1	Find the greatest common factor of each pair of monomials: 1. $102x^2y^4$; $-42x^7y^3$ 2. $-105m^3k$; $70km^4$
11.2	Given appropriate polynomials, the student will factor each completely.	11.2 .1	Factor each polynomial completely: 1. $4a^2 + 12a$ 2. $8 - 50t^2v^2$ 3. $a(b - 2c) + c(b - 2c)$ 4. $ab^2 + cb^2 - 4a - 4c$ 5. $(a-b)^2 - t^2$ 6. $6x^2 + 12x + 6$ 7. $x^2 - 3x - 10$
11.3	Given equations with appropriate polynomial terms, the student will complete necessary transformations, factor and solve for the variables.	11.3 .1	Specify the solution set of each equation by roster: 1. $3x(5x + 20) = 0$ 2. $m^2 = 6m$ 3. $x^2 - 14x + 49 = 0$ 4. $(2y - 1)^2 = 9$

COURSE ALGEBRA I

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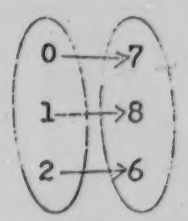
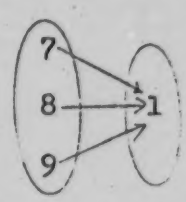
TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Functions

T.P.O. The student will demonstrate his knowledge of the properties of functions by stating whether given relations are functions and by finding specified values of given functions, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.1	The student will find the Cartesian product of given sets.	12.1 .1	If A = {a, b, c, d} and B = {x, y, z}, write: 1. A X B 2. B X A
12.2	Given sets of ordered pairs, the student will state the domain and range of each.	12.2 .1	State the domain and range of each of the following relations: 1.  2.  3. {(1, 2), (2, 3), (3, 4)} 4. {(x, x^3): x ∈ {0, 1, 2}} 5. h: x ⟶ -x

COURSE ALGEBRA I

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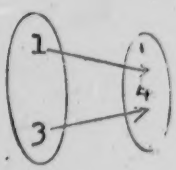
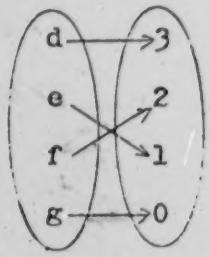
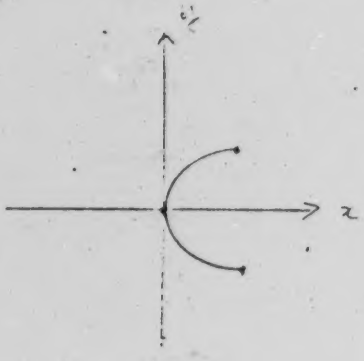
TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.3	Given sets of ordered pairs, the student will indicate those which are functions.	12.3 .1	Tell whether the set of ordered pairs are functions: 1. {(1, 1), (2, 2), (3, 3)} 2. {(1, 1), (1, 2), (1, 3)} 3 {(1, 1), (2, 1), (3, 1)} 4.  5.  6. 

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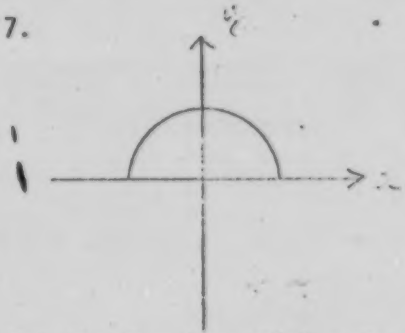
COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.3	Cont'd	12.3 .1	7. 
12.4	The student will find specified values for given functions.	12.4 .1	For the function $f(x) = 3x - 2$, find: 1. $f(3)$ 2. $f(-6)$ 3. $f(a + 2)$ 4. $f(n - 3) - f(n)$

COURSE ALGEBRA I

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TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Operations on rational expressions

T.P.O. The student will perform the four fundamental operations on rational expressions by simplifying appropriate given expressions, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.1	The student will reduce given rational expressions to lowest terms.	13.1 .1	Express in lowest terms: 1. $\frac{12ab}{15ac}$ 2. $\frac{3a + 3b}{3x + 3y}$ 3. $\frac{9b}{6a - 3c}$ 4. $\frac{a^2 + 5a + 6}{2a + 4}$ 5. $\frac{n^2 - 7n}{n^2 + 2n - 63}$
13.2	The student will write given expressions with negative or zero exponents in a form involving no zero or negative exponents.	13.2 .1	Write each expression in a form involving no zero or negative exponents. 1. $3x^{-2}$ 2. $(3x)^{-2}$ 3. $a^{-3} \cdot b^{-2}$ 4. $\frac{a^{-3}}{a^5}$

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COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO.
13.0

SKILL/KNOWLEDGE BASED ON:
Operations on rational expressions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.2	Cont'd	13.2 .1	Simplify, and express your answer with only positive exponents: 1. $\frac{4a^{-3}b^{0}}{2a^{2}b^{-1}}$ 2. $\left(\frac{2a^{-2}}{b^{-1}}\right)^{-2}$ 3. $4x^{2}(4^{-1}k + 4k^{-2})$ 4. $\frac{(a^{3})^{-2}}{(a^{-2})^{3}}$
13.3	The student will find the products and quotients of given rational expressions.	13.3 .1	Simplify: 1. $\frac{11}{2} \cdot \frac{8}{3}$ 2. $\frac{n}{x} \cdot \frac{x^{2}}{t}$ 3. $\frac{a^{2} + a}{2} \cdot \frac{6}{a^{2} - 1}$ 4. $\frac{10}{x - y} \div \frac{5}{y - x}$

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Operations on rational expressions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.3	Cont'd	13.3 .1	5. $\frac{x^2 - 9}{2} \cdot \frac{1}{x - 3}$ 6. $\frac{x^2 - 5x + 6}{2x + 4} \div \frac{x + 2}{2x - 6}$
13.4	The student will find the sums and differences of given rational expressions.	13.4 .1	Express each sum as a rational expression in lowest terms: 1. $\frac{8}{5} - \frac{2}{5} + \frac{7}{5}$ 2. $\frac{2x}{3y} - \frac{x - 3}{3y}$ 3. $\frac{4x - 3}{x^2 - x - 6} - \frac{2x - 7}{x^2 - x - 6}$ 4. $\frac{4y}{y^2 - 36} + \frac{2}{y - 6}$ 5. $\frac{x - 3}{x + 5} - \frac{x - 2}{x + 3}$ 6. $\frac{3}{r + 2} - \frac{2}{r - 3} + \frac{5}{r - 1}$

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Solving verbal problems

T.P.O. Given verbal problems with solutions dependent upon the skills inherent in Algebra I, the student will solve the problems with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.1	Given verbal problems involving distance, rate, and time, the student will translate the given facts into mathematical terms and solve for the missing elements.	14.1 .1	1. A jet and a propeller plane leave the same airport at the same time and travel in opposite directions at 600 miles per hour and 350 miles per hour, respectively. In how many hours will they be 2850 miles apart? 2. A car traveled 290 miles in 7 hours. For the last 3 hours of the trip its average rate was 20 miles per hour less than twice its average rate for the first four hours. Find the two rates at which it traveled. 3. At 10:00 A.M. two boys on motorbikes start out to meet each other from towns located 28 miles apart. One boy travels 3 miles an hour faster than the other. At what rate must each travel if they are to meet at 11:20 A.M?
14.2	Given verbal problems involving mixture of elements, the student will translate the words into mathematical terms and find the required percentages and/or quantities.	14.2 .1	1. A druggist has 10 ounces of 20% solution of argyrol. How many ounces of a 8% argyrol solution should he add to form a 12% argyrol solution? 2. How much distilled water should a nurse add to reduce 16 ounces of a 25% solution of antiseptic to a solution that is 10% antiseptic?

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Solving verbal problems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.2	Cont'd	14.2 .1	3. A 40-pound solution of salt water contains 15% salt. What is the least amount of water that can be added to form a solution that is no more than 5% salt?
14.3	Given verbal problems using consecutive integers to illustrate number or age relationships, the learner will determine the relationships algebraically and find the ages or numbers required.	14.3 .1	1. Find four consecutive integers whose average is greater than 6 more their sum. 2. The difference when the smaller of two consecutive integers is subtracted from twice the larger is at least 6. Find the smallest such pair of integers. 3. Jack is 8 years more than twice as old as Fran. Give two possibilities for their ages. 4. Ben's age is four years less than three times that of his younger sister Amy. Half of Ben's age increased by Amy's age is 2 years more than twice Amy's age. Find their ages.
14.4	Given verbal problems involving angle relationships or other geometric measure relationships, the student will translate these into mathematical sentences and determine the required measurements.	14.4 .1	1. How large is an angle whose complement contains 5° more than half its supplement? 2. One angle of a triangle exceeds another by 23°. The third angle is 6° less than the sum of the other two. Find the angles.

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO: 14.0

SKILL/KNOWLEDGE BASED ON: Solving verbal problems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.4	Cont'd	14.4 .1	3. The perimeter of a rectangle is 146 centimeters. The length exceeds the width by 9 centimeters. Find the dimensions. 4. The length of one leg of a right triangle is 4 inches less than twice the length of the other leg. The area of the triangle is 24 square inches. Find the length of each leg.
14.5	Given verbal problems involving work situations, the student will represent them algebraically and solve for required information.	14.5 .1	1. One pipe can fill a tank in 5 hours. A second can fill it in 3 hours. How long will it take both pipes together to fill the tank? 2. An air conditioner lowers the temperature 10 degrees in 12 minutes. With a second air conditioner also working, this change takes 4 minutes. How long would the second device need to produce this change? 3. One bulldozer clears land twice as fast as another. Together they clear a large tract in 1 1/2 hours. How long would the larger bulldozer take? 4. Together, three men paint a barn in 6 hours. Alone, the first man takes twice as long as the second, and the second takes 6 hours longer than the third. In how many hours can the slowest man paint the barn?

COURSE ALGEBRA I

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Solving verbal problems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.6	When given verbal problems involving direct and inverse variation, the student will translate appropriately and solve.	14.6 .1	1. If x varies directly as y -2, and x = 6 when y = 11, find y when x = 4. 2. If x varies inversely as t + 3, and x = 6 when t = 7, find t when x = 15. 3. If 5 cubic centimeters of blood contains 0.C gram of hemoglobin, how much hemoglobin would you expect to find in 8.7 cubic centimeters of L'ood? 4. A three-quarter-inch wire has 12 ohms resistance; how much has the same length of half-inch wire, if resistance varies inversely as the square of the diameter? 5. The force between two small electrical charges varies jointly as the charges on the bodies and inversely as the square of the distance between them. When the charge on one body is 9 units and on the other 8 units, and they are 6 centimeters apart, the force between them is 2 dynes. Determine the force on the bodies when they are 4 centimeters apart.

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ALGEBRA II

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Real Numbers

T.P.O. Given a non-empty set of real numbers together with defined operations, the student will demonstrate his knowledge of the properties of real numbers, equality, and inequality by naming the properties illustrated by given statements, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	The student will name the property of real numbers illustrated by each given statement.	1.1 .1	Given that a, b, and c are real numbers, name the property of real numbers illustrated by each of the following: 1. $b + (-b) = 0$ 2. $a(b + c) = ab + ac$ 3. $c \cdot 1 = c$ 4. $a + b = b + a$ 5. $a(b \cdot c) = (a \cdot b)c$
1.2	The student will name the property of equality or inequality which supports indicated conclusions.	1.2 .1	Name the property of equality or inequality which supports the indicated conclusion. 1. If $3x = 15$, then $x = 5$. 2. If $2x - 3 = 7$, then $2x = 10$. 3. If $x = y$ and $y = z$, then $x = z$. 4. If $x + a = b$, then $b = x + a$. 5. If $x - 4 < 6$, then $x < 10$. 6. If $\frac{1}{2}x < -3$, then $x < -6$. 7. If $x > y$ and $y > 5$, then $x > 5$. 8. If $-5x > 20$, then $-4 > x$.

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Real Numbers

T.P.O. Given a non-empty set of real numbers together with defined operations, the student will demonstrate his knowledge of the properties of real numbers, equality, and inequality by naming the properties illustrated by given statements, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.3	The student will classify given statements about real numbers as true or false.	1.3 .1	Classify the given statements as true or false. Assume that a, b, c are real numbers. 1. If $a < 0$, then $a^2 < 0$. 2. If $a \cdot b = 0$, then both a and b must be zero. 3. If $0 < b < 1$, then $b^2 < b$. 4. If $a = 0$, then $\frac{6}{a}$ is a real number.

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Algebraic terms and symbols

T.P.O. Given statements using algebraic terms and symbols, the student will correctly identify the statements which are true with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	Given statements, the student will identify those which are true.	2.1 .1	Classify each of the following as true or false. 1. It is false that $4 + 2 = 6$. 2. $7 - 4 = 4 - 7$. 3. $6(4 - 3) = 24 - 18$. 4. $0 + 0 = 0 \times 0$.
2.2	The student will simplify numerical expressions by correctly applying the use of symbols of inclusion and order of operation.	2.2 .1	Find the value of each of the following expressions: 1. $15 - (4 + 8 \div 2) - 6$ 2. $[36 - 4(3 + 1)] \div (4 - 6)$ 3. $2(-4) + 21 \div 3 + 4$ 4. $12 - 6 \div \frac{1}{2}$

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Equations and inequalities in one variable

T.P.O. Given first degree, second degree, and absolute value equations and inequalities in one variable, the student will demonstrate an understanding of the transformations needed to find the solution sets by solving selected equations and inequalities with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	The student will graph the solution set of linear equations and inequalities in one variable.	3.1 .1	Graph the solution set of each of the following on the number lines provided: 1. $2x - 5 = 13$ 2. $8 - y = y - 4$ 3. $2(3z - 1) = 3(2z - 1)$ 4. $3x + 2 < 7 - 2x$ 5. $-2(y + 3) \geq 3(2 - y)$ 6. $\|3x + 1\| = 7$ 7. $\|8 - y\| < 3$
3.2	Given quadratic equations, the student will find the solution sets by "completing the square" method.	3.2 .1	Solve by completing the square: 1. $x^2 - 6x - 7 = 0$ 2. $11x = 10x^2 - 6$ 3. $3t^2 + 15t - 15 = 0$
3.3	The student will find the solution sets of quadratic equations by factoring.	3.3 .1	Find the solution set of each of the following over the real numbers: 1. $x^2 - 9x = 0$ 2. $t^2 - 4 = 0$ 3. $(s - 1)(s - 3) = 15$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Equations and inequalities in one variable

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.4	The student will find the solution sets of quadratic equations by the use of the quadratic formula.	3.4 .1	Solve by using the quadratic formula: 1. $3r^2 + r = 1$ 2. $6x^2 + 10x + 3 = 0$ 3. $2x(x - 2) = 3(4 - x)$ 4. $\frac{2}{x - 1} + \frac{1}{x + 1} = 3$
3.5	The student will describe the solution sets of quadratic inequalities by graphing.	3.5 .1	Graph the solution sets of each of the following inequalities over the set of real numbers. 1. $t^2 - 4t < 0$ 2. $(x + 2)(x - 3) \geq 0$ 3. $m^2 - m > 6$

COURSE ALGEBRA II

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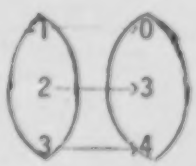
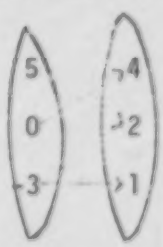
TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Functions

T.P.O. Given a list of relations, the student will demonstrate understanding of functions by correctly selecting those relations which are functions, and finding the value of given functions at specific domains, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	The student will identify the domain and range of selected relations.	4.1 .1	State the domain and range of each of the following: 1.  2. $\{(0, 5), (-, 6), (2, 9), (3, 11)\}$ 3.
4.2	The student will demonstrate his understanding of the definition of functions by correctly selecting from a list of relations those which are functions.	4.2 .1	State whether each relation indicated below is a function. 1. 

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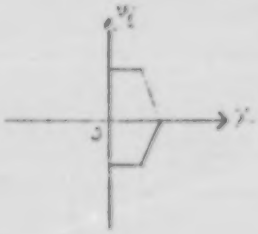
COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.2	Cont'd	4.2 .1	2. 
			3. $\{(2, 3), (2, 2), (2, 4), (2, 5)\}$
4.3	The student will demonstrate his understanding of the function symbol f(x) by evaluating f(x) at given values for x.	4.3 .1	If $p(x) = x^3 - 2x^2 + 4x - 1$, find each of the following: 1. p(3) 2. p(-4) 3. p(a - 1)

COURSE ALGEBRA II

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TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Graphs of Linear Relations

T.P.O. Given, first, a list of selected linear relations, the student will graph each relation and secondly, given a list of conditions of linear relations, the learner will derive the equations of these relations with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	The student will graph appropriate equations or sets of ordered pairs representing linear relations.	5.1	Graph each of the following: 1. $x + y = 3$ 2. $\{(x, y): y = 4x + 7\}$ 3. $x - y > 3$ 4. $\|x\| < 2$
5.2	The student will determine the equation of lines passing through points with given coordinates and having given slopes.	5.2 .1	Determine an equation for the line with given slope m, through the point whose coordinates are given. 1. $(-1, 2)$; $m = 1$ 2. $(-2, 4)$; $m = -\frac{3}{4}$ 3. $(2, 3)$; $m = 0$ 4. $(-4, 1)$; no slope
5.3	Given pairs of points (ordered pairs), the student will write the equation of the lines containing these pairs.	5.3 .1	Find a linear equation whose graph contains the points whose coordinates are given. 1. $(2, 3)$; $(5, 6)$ 2. $(0, -1)$; $(4, 3)$ 3. $(0, 0)$; $(0, 6)$ 4. $(4, 5)$; $(3, 5)$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Graphs of Linear Relations

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.4	Given the slopes of lines and their y-intercepts, the student will write the equations of the lines.	5.4 .1	1. Determine an equation of the line with y-intercept 2 and slope of $\frac{1}{2}$. 2. Determine the equation of the line with y-intercept of 5 and parallel to the graph of $y = x$.
5.5	Given equations of linear relations in two-point form, in point-slope form, and in slope-intercept form, the student will rewrite these in the form of $Ax + By = C$, where A, B, and C are integers.	5.5 .1	For each line determine an equation of the form $Ax + By + C$, where A, B, and C are integers. 1. (2, 3); (5, 6) 2. (3, 4); $m = 1$ 3. Parallel to x-axis, y-intercept -9.
5.6	The student will solve verbal problems relating to direct variation.	5.6 .1	1. If y is 12 when x is 48, find x when y is 20. 2. If C is directly proportional to d and C is 8 when d is 8, find C when d is 3. 3. If a varies directly as $2b - 1$, and a is 30 when b is 3, find b when a is 24.

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Quadratic Relations

T.P.O. Given lists of selected quadratic relations, the student will identify the conic sections represented and name their identifying parts with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	From a list of equations whose graphs are circles, the student will, first, identify the center and radius of each and secondly, sketch the graph of each.	6.1 .1	For each of the following equations whose graphs are circles, state the center and radius and then sketch the graph. 1. $\{(x, y): x^2 + y^2 = 9\}$ 2. $\{(x, y): x^2 + y^2 - 4x + 2y - 4 = 0\}$
6.2	From a list of equations whose graphs are parabolas, the student will identify the vertex, the equation of the axis of symmetry and then sketch the graph of each.	6.2	For each of the following equations, whose graphs are parabolas, state the coordinates of the vertex, the equation for the axis of symmetry, and sketch the graph: 1. $\{(x, y): y = 3x^2\}$ 2. $\{(x, y): x = y^2 + 4y\}$ 3. $\{(x, y): y = 3 - 6x - x^2\}$
6.3	From a list of equations whose graphs are ellipses with center at the origin, the student will identify the x-intercepts, y-intercepts, and sketch the graphs of each.	6.3 .1	For each of the following equations whose graphs are ellipses, state the x-intercepts, y-intercepts, and sketch the graph. 1. $\{(x, y): \frac{x^2}{16} + \frac{y^2}{9} = 1\}$ 2. $\{(x, y): x^2 + 4y^2 = 4\}$

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Quadratic Relations

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.4	From a list of equations whose graphs are hyperbolas with center at the origin, the student will state the equations of the asymptotes and sketch the graph of each.	6.4 .1	For each of the following equations whose graphs are hyperbolas, state the equations for the asymptotes and sketch the graph for each of the following: 1. $\{(x, y): \frac{x^2}{4} - \frac{y^2}{9} = 1\}$ 2. $\{(x, y): 49y^2 - 4x^2 = 196\}$
6.5	From a list of selected quadratic relations, the student will identify the conic sections represented and name their identifying parts.	6.5 .1	1. The graph of relation, $\{(x, y): \frac{x^2}{3} + \frac{y^2}{4} = 1\}$ is: (a) an ellipse (b) a circle (c) a parabola (d) a hyperbola 2. The graph of #1 has x-intercept of: (a) 3 and -3 (b) 4 and -4 (c) $\sqrt{3}$ and $-\sqrt{3}$ (d) 2 and -2

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Quadratic Relations

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.5	Cont'd	6.5 .1	3. The graph of the equation $xy = 2$ is: (a) a parabola (b) a hyperbola (c) not given any special name (d) a straight line

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Solution Sets of Systems of Equations and Inequalities

T.P.O. Given selected systems of linear and quadratic equations and inequalities, the student will find the solution sets of these systems with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	The student will use substitution or elimination of variables by addition or subtraction to find the solution set of selected systems of linear equations.	7.1 .1	Find the solution set of each of the following systems: 1. $x - 8y = 11$ $2x - 16y = 22$ 2. $x + 3y + 4z = 1$ $y + z = 1$ $x - 2z = 3$
7.2	The student will use determinants to find the solution sets of selected systems of linear equations	7.2 .1	Find the solution set for the following system by using determinants: $x + y + z = 4$ $2x - y + 2z = 5$ $x - 2y - z = -3$
7.3	Given selected systems of linear inequalities the student will graph each inequality and indicate the solution set of each system by shading the intersection of the inequalities.	7.3 .1	Graph the solution set of the following systems: 1. $y > 2x - 3$ $y < 2 - x$ 2. $4 - x \leq y < 2 - x$

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Solution Sets of Systems of Equations and Inequalities

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.4	The student will use substitution or elimination of one variable by addition or subtraction to find the solution sets of selected systems of quadratic equations.	7.4 .1	Find the solution set of each of the following: 1. $y = \frac{1}{2}x^2$ $y = x$ 2. $x^2 + y^2 = 16$ $xy = 4$
7.5	The student will solve verbal problems by use of systems of linear or quadratic equations.	7.5 .1	With a given tail wind, an airplane can travel 1080 miles in six hours. But flying in the opposite direction with the same wind blowing, the plane can fly only one-third of that distance in half the time. Find the plane's speed and the wind speed.

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Operations with Polynomials

T.P.O. Given selected polynomials, the student will demonstrate skills in the basic operations and in simplification of polynomials by performing the basic operations with selected expressions and leaving the answers in simplest form with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	The student will state the degree of selected polynomials.	8.1 .1	State the degree of each polynomial: 1. $-5x^4 + 2x^3 - 3x^2 + 6x - 1$ 2. $-3(m^3 + 2m + 14)$
8.2	The student will add, subtract, multiply, and divide polynomials and leave the answers in simplest form.	8.2 .1	Find a polynomial in simple form equivalent to the given expression: 1. $x(3x + 4) + 2(x^2 - 7x + 6) - 3x(1 - 3x)$ 2. $\frac{12x + 9}{3}$
8.3	The student will factor polynomials over the set of integers.	8.3 .1	Factor each polynomial completely. 1. $2x^2 - 18$ 2. $8x^3 + 1$ 3. $y^2 + 4y - 12$ 4. $x^2 - y^2 + 4y - 4x$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Logarithms

T.P.O. Given selected expressions and equations, the student will perform indicated operations and solve equations using the laws of logarithms with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	Given an equation in either logarithmic or exponential form, the student will change to the other form.	9.1	Give an equivalent exponential form for each statement: 1. $\log_3 9 = 2$ 2. $\frac{1}{2} = \log_4 2$ Given an equivalent logarithmic form for each statement: 3. $16 = 2^4$ 4. $81 = 3^4$
9.2	Given a 4-place logarithm table and selected expressions, the student will find the products of these expressions using the laws of logarithms.	9.2 .1	Compute the following by use of logarithms: 1. (3.12) (17.6) 2. (211.4) (0.613) (2.35)
9.3	Using a 4-place logarithm table and given selected expressions, the student will compute their quotients.	9.3 .1	Compute the following by use of logarithms: 1. $\frac{80.7}{41.6}$ 2. $\frac{(61.2)\,(41.8)}{153}$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Powers

T.P.O. Given a set of binomial expressions, the student will expand the expressions by applying the binomial theorem with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.1	The student will expand binomial expressions to the indicated powers by applying the binomial theorem.	10.1 .1	Using the binomial theorem expand each binomial expressing the result in its simplest form. 1. $(c + d)^6$ 2. $(3x - 1)^3$
10.2	The student will find and simplify a specified term in the expansion of a binomial to a specified power.	10.2 .1	Find and simplify the specified term in each expansion: 1. Third, $(x + m)^4$ 2. Fifth, $(3d^2 - 2)^5$

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COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Exponents

T.P.O. Given rational algebraic expressions, the student will demonstrate skill in dealing with the laws of real exponents by simplifying selected expressions, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	Using powers with rational exponents, the student will write radical expressions in exponential form.	11.1 .1	Write in exponential form where all exponents are positive. Assume that all bases are positive. 1. $\sqrt{3x}$ 2. $\sqrt[3]{16a^5b^6}$
11.2	Given radical expressions in exponential form, the student will write each in radical form using a simple radical sign.	11.2 .1	Write in radical form using a simple radical sign and positive exponents only. Assume that all bases are positive. 1. $3^{\frac{1}{2}}$ 2. $7\,a^{\frac{1}{2}}\,b^{\frac{2}{3}}$
11.3	Given rational algebraic expressions, the student will use the laws of real exponents and simplify each.	11.3 .1	Express each in simple form: 1. $\frac{6abc^2}{15a^2} \cdot \left(\frac{2bc}{3a}\right)^{-1}$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Complex Numbers

T.P.O. Given complex numbers, the student will perform the basic operations on given pairs of complex numbers and solve equations involving complex roots with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.1	The student will add, subtract, multiply, and divide complex numbers.	12.1 .1	Let $r = 2 + 9i$, $s = i$, compute: 1. $r + s$ 2. $r - s$ 3. rs 4. $\frac{r}{s}$
12.2	The student will solve equations containing complex roots.	12.2 .1	Find the solution set for each of the following: 1. $z^2 = 16 = 0$ 2. $(1 + i)z = 6i$ 3. $2x^2 + 2x + 1 = 0$

COURSE ALGEBRA II

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Slide Rule

T.P.O. Given a slide rule, the student will demonstrate his knowledge of the use of the slide rule in performing the operations of multiplication, division, squaring, and taking square roots with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.1	The student will use the slide rule to perform the operation of multiplication.	13.1 .1	Using the slide rule, find the following products: 1. (99.0) (3.46) 2. (0.00620) (850)
13.2	The student will use the slide rule to perform the operation of division.	13.2 .1	Using the slide rule, find the following quotients: 1. $760 \div 2.44$ 2. $60200 \div 0.011$
13.3	The student will use the slide rule to perform the operation of squaring.	13.3 .1	Using the slide rule, find the squares of the following numbers: 1. 0.133 2. 6.71
13.4	The student will use the slide rule to perform the operation of taking the square root.	13.4 .1	Using the slide rule, find the square root of the following numbers: 1. 572 2. 22.4

GEOMETRY

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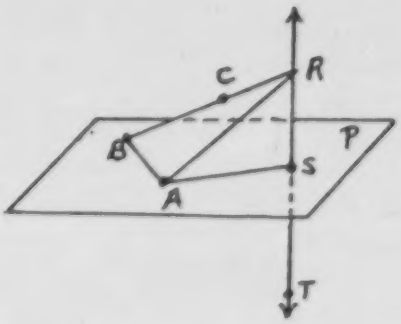
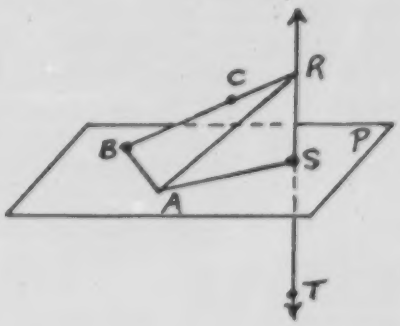
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Geometric terms and symbols

T.P.O. The student will answer true-false, multiple choice, and completion type questions relating to basic undefined terms, basic definitions, angles, special angles, and angle relationships. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Given a figure, such as shown below, the student will classify given statements describing the relationship between the indicated points, lines, and planes as true or false. 	1.1.1	Refer to the given figure below and classify each of the statements as either true or false.  1. Point A lines in plane P. 2. RT lies in plane P. 3. Point S is the intersection of plane P and $\overleftrightarrow{RT}$. 4. Points A, B, and S are coplanar points. 5. Points R, C, and S are collinear points. 6. Points A, S, and R are coplanar but not collinear points. 7. Point T lies in the plane that contains points A, R, and S.

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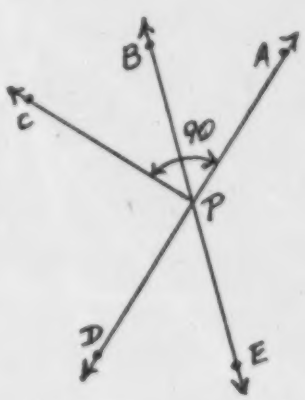
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Geometric terms and symbols

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.2	Given a plane figure consisting of intersecting lines and rays together with appropriate information concerning the figure, the student will: A. identify acute, right, and obtuse angles; B. name pairs of vertical, complementary, and supplementary angles.	1.2	Given the plane figure below in which AD and BE intersect at P and m∠APC = 90. 
		1.2.1	Name an acute angle.
		1.2.2	Name a right angle.
		1.2.3	Name an obtuse angle.
		1.2.4	Name a pair of vertical angles.
		1.2.5	Name a pair of complementary angles.
		1.2.6	Name a pair of supplementary angles.

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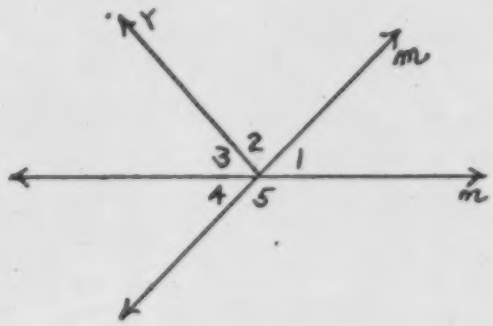
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Geometric terms and symbols

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.3	The student will solve problems relating to the measures of complementary, supplementary, and vertical angles.	1.3	Questions 1-3; Refer to the plane figure below in which m and n are lines, and r is a ray. 
		1.3.1	If $m\angle 1 = 3x - 10$, and $m\angle 4 = x + 2$, then x = ?.
		1.3.2	If $m\angle 4 = 3x - 60$, and $m\angle 5 = 2x + 90$, then x = ?.
		1.3.3	If $\angle 1$ and $\angle 3$ are complementary, then $m\angle 2$ = ?.
		1.3.4	The measure of one of two complementary angles is 18 less than twice the measure of the other. Find the measure of each angle.

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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Properties of real numbers

T.P.O. Given a non-empty set of real numbers together with defined operations, the student will demonstrate his knowledge of the properties of real numbers, equality, and inequality by naming the properties illustrated by given statements. 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	The student will name the property of real numbers illustrated by each given statement.	2.1	Given that a, b, and c are real numbers, name the property of real numbers illustrated by each of the following:
		2.1.1	$a \cdot b = b \cdot a$
		2.1.2	$(a + b) + c = a + (b + c)$
		2.1.3	$b + 0 = b$
		2.1.4	$a(b + c) = ab + ac$
		2.1.5	$a \cdot 1 = a$
2.2	The student will name the property of equality or inequality which supports indicated conclusions.	2.2	Name the property of equality or inequality that is illustrated by each statement. Assume that a, b, and c are real numbers.
		2.2.1	If $a > b$ and $b > c$, then $a > c$.
		2.2.2	If $a + b = c$, then $c = a + b$.
		2.2.3	If $a < c$, then $-3a > -3c$.
		2.2.4	If $2a - 3 = 7$, then $2a = 10$.

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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Properties of real numbers

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.3	The student will classify given statements about real numbers as true or false.	2.3	Classify the given statements as true or false. Assume that a, b, c are real numbers.
		2.3.1	If $b < 0$, then $b^2 > 0$.
		2.3.2	If $a > 0$, then $\frac{1}{a} < 0$.
		2.3.3	For any real number a, $\lvert -a \rvert - \lvert a \rvert = 0$.
		2.3.4	If $a + 1 = b$, the $a < b$.

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will use initial postulates and theorems relating to points, lines, segments, and planes* to answer questions or make deductions about given relationships existing between points, lines, segments, and planes. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	Given relationships existing between points, lines, segments, and planes, the student will answer true-false, completion, or multiple choice type questions relating to the initial postulates and theorems*.	3.1	Fill in the blank:
		3.1.1	A plane contains at least _____
		3.1.2	If two planes intersect, exactly one _____ contains both _____.
		3.1.3	If points A, K, and N lie on a line and AN + NK = AK, then _____ lies between ____ and ____.
		3.1.4	If S is the midpoints of $\overline{MN}$, then ____ = ____.
		3.1.5	The distance between two distinct points must be a _____ number.
			Classify each of the following as true or false:
		3.1.6	Any two lines lie in exactly one plane.
		3.1.7	Two intersecting lines have just one point in common.
		3.1.8	Space contains at least four points.
		3.1.9	Two poins can be noncollinear.
		3.1.10	Given that points A, B, and C are collinear. If $\underline{AB}$ = BC, then B is

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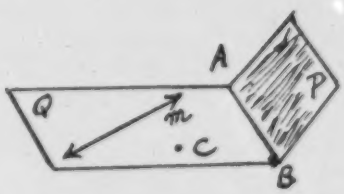
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.2	The student will state the postulate or theorem* which enables him to make deductions about given relationships existing between points, lines, segments, and planes.	3.2	Using the figure below, state the postulate or theorem which enables you to make a deduction about the following: 
		3.2.1	The intersection of planes P and Q.
		3.2.2	The number of planes containing both line m and point C.
		3.2.3	The number of planes through points A, B, and C.
		3.2.4	The number of lines containing points A and B.

*Points, Lines, Segments, and Planes

Postulates:

1. A line contains at least two points; a plane contains at least three points not all on one line; and space contains at least four points not all in one plane.

2. Through any two different points there is exactly one line.

3. Through any three points which are not on one line there is exactly one plane.

4. If two points lie in a plane, then the line containing them lies in that plane.

5. If two different planes intersect, then their intersection is a line.

6. Between any two points there is a unique distance.

7. The set of points on a line can be put in one-to-one correspondence with the real numbers in such a way that:

   A. Any particular point is paired with zero;
   B. The distance between any two points is equal to the absolute value of the difference between the numbers corresponding to those points.

Theorems:

1. If two lines intersect, they intersect in exactly one point.
2. If a point lies outside a line, exactly one plane contains the line and the point.
3. If two lines intersect, exactly one plane contains both lines.
4. On a ray there is exactly one point at a given distance from the endpoint of the ray.
5. A segment has exactly one midpoint.

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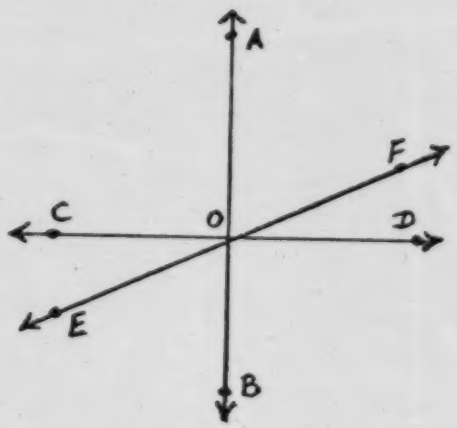
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will use postulates and theorems relating to angles* to answer questions and justify statements pertaining to relationships between angles. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	Given relationship between angles, the student will answer true-false, multiple choice, or completion type questions concerning postulates and theorems relating to angles*.	4.1	Given a figure consisting of three coplanar lines passing through O with $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$. Classify each of the following statements as true or false. 
		4.1.1	$m\angle AOC = 90$
		4.1.2	$m\angle FOD = m\angle ACD - m\angle ADF$
		4.1.3	$\angle AOD$ is an right angle.
		4.1.4	$\angle ACF$ and $\angle ACD$ are adjacent angles.

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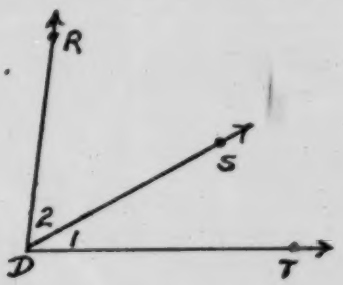
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
			Refer to the plane figure below: 
		4.1.5	$m\angle 1 + m\angle 2 = m\angle RDT$ by the ___ theorem.
		4.1.6	If $m\angle 1 = m\angle 2$, the $\overrightarrow{DS}$ _____ $\angle RDT$.
		4.1.7	If $m\angle 1 + m\angle 2 = 90$, then $\overrightarrow{DR}$ is ___ $\overrightarrow{DT}$.
		4.1.8	If $m\angle RDT = a$ and $m\angle 1 = b$, then $m\angle 2 =$?

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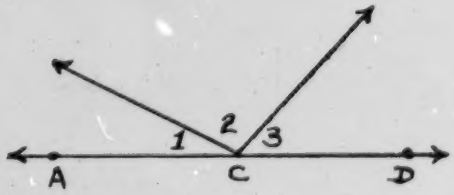
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.2	Given relationship between angles, the student will find the measure of each angle.	4.2.1	An angle has a measure of $2x + 20$, and its vertical angle a measure of $5x - 34$. Find the measure of each angle.
		4.2.2	One angle has a measure of $3a$. A second angle has a measure of $90 - a$. What is the value of "a" if these angles are supplementary?
			In the plane figure below A, C, D are collinear points. 
		4.2.3	Find the measure of $\angle 1$ if $\angle 1$, $\angle 2$, and $\angle 3$ have measure in the ratio 4 : 5 : 6.
		4.2.4	Find the measure of $\angle 1$ if $m\angle 1 = 5x$, $m\angle 2 = x + 40$, and $m\angle 3 = x^2 - 20$.

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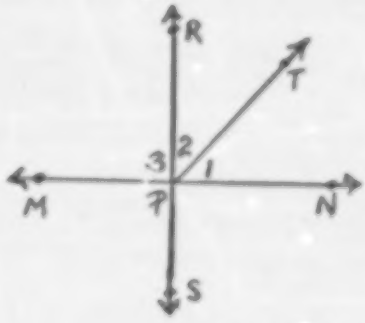
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.3	Given statements pertaining to angle relationships, the student will give the definition, postulate, and/or theorem* which supports the indicated conclusions.	4.3	For each of the following statements about the given figure, indicate the definition, postulate, or theorem that supports the conclusion. 
		4.3.1	If $\overleftrightarrow{RS} \perp \overleftrightarrow{MN}$, the $m\angle 3 = 90$.
		4.3.2	$m\angle 1 + m\angle 2 = m\angle RNP$.
		4.3.3	If $\angle 1$ and $\angle 2$ are complementary angles, then $m\angle 1 + m\angle 2 = 90$.
		4.3.4	If $m\angle 3 = 90$, then $\overleftrightarrow{RS} \perp \overleftrightarrow{MN}$.
		4.3.5	If $m\angle 1 = m\angle 2$, $\overrightarrow{PT}$ bisects $\angle RPN$.

*Angle Relationships

Posulates:

1. To every angle there corresponds a unique real number greater than 0 and less than 180. (Angle measurement postulate)

2. In the union of a half-plane and its edge, the set of rays with a common endpoint in the edge of the half-plane can be put in one-to-one correspondence with the real numbers from 0 to 180 inclusive in such a way that:

   A. One of the two opposite rays lying in the edge is paired with 0 and the other is paired with 180.
   B. The measure of any angle whose sides are rays of the given set is equal to the absolute value of the difference between the numbers corresponding to its sides.

Theorems:

1. Angle addition theorem.

2. If the exterior sides of two adjacent angles are opposite rays, the angles are supplementary.

3. In a half-plane, through the endpoint of a ray lying in the edge of the half-plane, there is exactly one other ray such that the angle formed by the two rays has a given measure between 0 and 180.

4. An angle has exactly one bisector.

5. All right angles are congruent.

6. If two lines are perpendicular, they meet to form right angles.

7. If two lines meet to form a right angle, the lines are perpendicular.

8. If two adjacent acute angles have their exterior side in perpendicular lines, the angles are complementary.

9. In a plane, through a given point of a line, there is exactly one line perpendicular to the line.

10. If two angles are supplementary to the same angle or to congruent angles, they are congruent to each other.

11. If two angles are complementary to the same angle or to congruent angles, they are congruent to each other.

12. If two lines intersect, the vertical angles formed are congruent.

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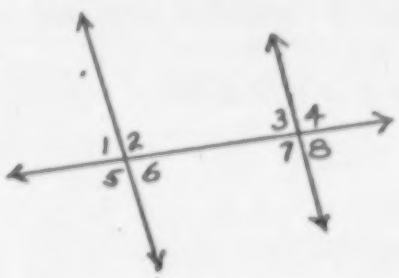
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will apply the Parallel Postulate and related theorems* to solve appropriate problems. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	Given a plane figure consisting of two lines and a transversal, the student will name pairs of: A. corresponding angles B. alternate interior angles C. alternate exterior angles D. interior angles on the same side of the transversal E. exterior angles on the same side of the transversal	5.1	In the plane figure below name: 
		5.1.1	Four pairs of corresponding angles.
		5.1.2	Two pairs of alternate interior angles.
		5.1.3	Two pairs of alernate exterior angles.
		5.1.4	Two pairs of interior angles on the same side of the transversal.
		5.1.5	Two pairs of exterior angles on the same side of the transversal.

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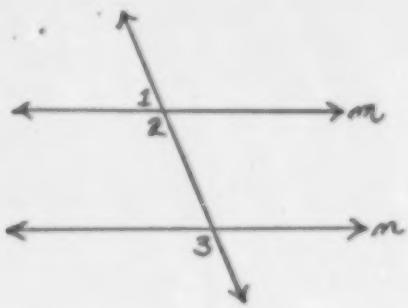
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.2	The student will apply the Parallel Posulate to solve appropriate problems.	5.2	Refer to the figure below in which $m \parallel n$. 
		5.2.1	Find x if $m\angle 1 = 3x - 50$ and $m\angle 3 = 2x - 20$.
		5.2.2	Find x if $m\angle 2 = 2x - 10$ and $m\angle 3 = x + 20$.

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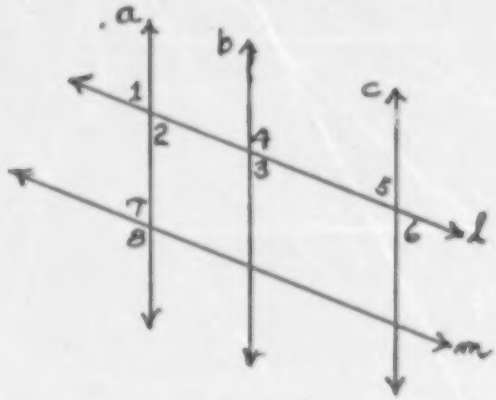
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.3	The student will apply converses of theorems relating to parallels* to solve appropriate problems.	5.3	State lines, if any are shown in the following plane figure, which must be parallel when: 
		5.3.1	$\angle 1 \cong \angle 7$
		5.3.2	$\angle 1 \cong \angle 6$
		5.3.3	$m\angle 4 + m\angle 5 = 180$
		5.3.4	$m\angle 2 = m\angle 3 + m\angle 5$
		5.3.5	$l \parallel m$, and $\angle 6 \cong \angle 7$

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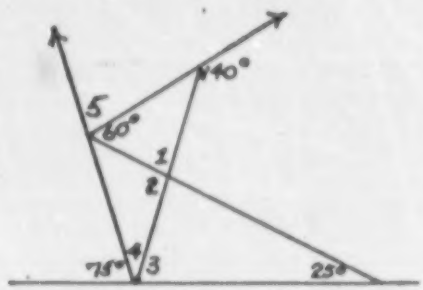
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.4	Applying parallels to polygons, the student will solve appropriate problems.	5.4.1	In the figure shown, compute the measure of the indicated angles.



a. m∠1 =

b. m∠2 =

c. m∠3 =

d. m∠4 =

e. m∠5 =

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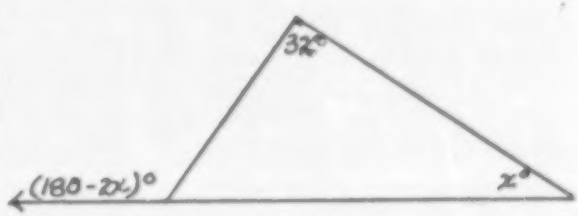
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		5.4.2	Given a regular n-gon in which $\angle 1$ is an interior angle, and $\angle 2$ is an exterior angle: a. Find n, if $m\angle 2 = 36$. b. Find n, if $m\angle 1 = 150$. c. Find $m\angle 1$, find = 8.
		5.4.3	Find the value of x in the given figure.



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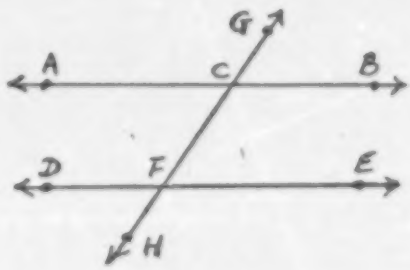
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.5	Given statements pertaining to the Parallel Postulate, the student will give the definition, postulate, and/or theorem* which supports the indicated conclusions.	5.5	For each of the following statements about the given figure, indicate the definition, postulate, or theorem that supports the statement. 
		5.5.1	If $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$, then $\angle BCF \cong \angle DFC$.
		5.5.2	If $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$, then $\overleftrightarrow{AB}$ and $\overleftrightarrow{DE}$ are coplanar.
		5.5.3	If $\angle ACF \cong \angle DFH$, then $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$.
		5.5.4	If $m\angle EFC = m\angle ACH$, then $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$.
		5.5.5	If $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$, then $m\angle EFC + m\angle FCB = 180$.

Parallel Lines

Postulates:

1. If two parallel lines are cut by a transversal, corresponding angles are congruent.

2. I f two lines are but by a transversal so that corresponding angles are congruent, the lines are parallel.

Theorems:

1. If two parallel planes are cut by a third plane, the lines of intersection are parallel.

2. If a transversal is perpendicular to one of two parallel lines, it is perpendicular to the other one also.

3. If two parallel lines are cut by a transversal, alternate interior angles are congruent.

4. Through a point outside a line not more than one parallel can be drawn to the line.

5. Through a point outside a line a parallel can be drawn to the line.

6. Through a point outside a line, exactly one line can be drawn perpendicular

7. In a plane, if two lines are perpendicular to a third line, they are parallel to each other.

8. If two lines are cut by a transversal so that alternate interior angles are congruent, the lines are parallel.

9. The sum of the measure of the angles of a triangle is 180.

10. The measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.

11. The sum of the measures of the angles of a convex quadrilateral is 360.

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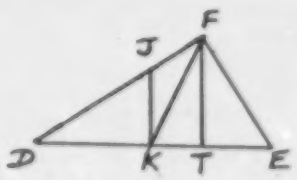
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. Given the appropriate conditions, the student will state a postulate, theorem, or corollary* that could be used to prove the triangle shown in a given diagram are congruent. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	Given the figure of a triangle, together with appropriate information concerning the figure, the student will: A. identify altitude and medians of the given triangle B. name the legs and hypotenuse of a right triangle C. name angles included between specified sides and sides included between specified angles.	6.1	In the figure shown, DEF is a triangle; $\overline{JK}$ and $\overline{FT}$ are $\perp \overline{DE}$; DK = KE. 
		6.1.1	Name an altitude of $\triangle DEF$.
		6.1.2	Name a median of $\triangle DEF$.
		6.1.3	Name a right triangle which has $\overline{JK}$ as a leg.
		6.1.4	Name the hypotenuse of rt. $\triangle KTF$.

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COURSE GEOMETRY

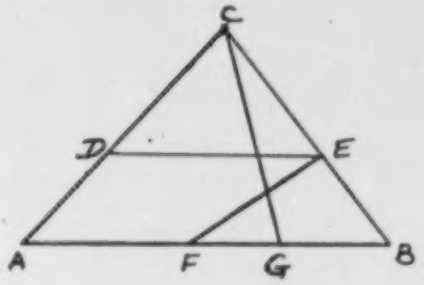
TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES

Referring to the diagram below, supply the missing details.



	Triangle	Side	Included Angle	Side
6.1.5	△AGC	$\overline{AC}$	____	$\overline{AG}$
6.1.6	△FBE	$\overline{FB}$	∠BFE	____
6.1.7	△CDE	____	∠DEC	$\overline{EC}$

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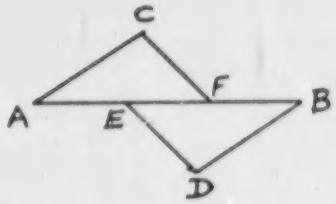
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.2	Given the appropriate conditions, the student will give a postulate, theorem, or corollary* that could be used to prove the triangles shown in a given diagram are congruent.	6.2.1	In each of the following, indicate a postulate, theorem, or corollary that could be used to prove the triangles shown in the diagram congruent. Given: $\overline{CD}$ the $\perp$ bisector of $\overline{AB}$, $AC = BD$.
		6.2.2	Given: $AE = FB$, $m\angle C = m\angle D$, $m\angle A = m\angle B$. 

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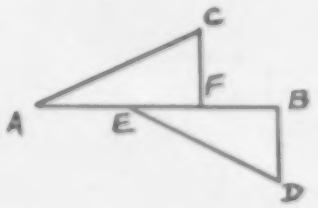
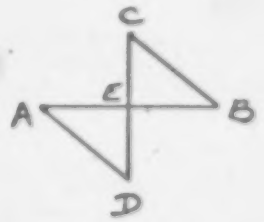
TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		6.2.3	Given: $\overline{CF} \perp \overline{AB}$, $\overline{ED} \perp \overline{AB}$, $AE = FB$, $m\angle A = m\angle BED$. 
		6.2.4	Given: $\overline{AB}$ the $\perp$ bisector of $\overline{CD}$. $m\angle B = m\angle A$. 

Congruent Triangles

Postulates:

1. If three sides of one triangle are congruent to three sides of another triangle, the triangles are congruent. (SSS Postulate)

2. If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, the triangles are congruent. (SAS Postulate)

3. If the hypotenuse and a leg of one right triangle are congruent to the hypotenuse and a leg of another right triangle, the triangles are congruent. (HL Postulate)

4. If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, the triangles are congruent. (ASA Postulate)

Theorems:

1. Congruence of triangles is reflexive, symmetric, and transitive.

2. If the legs of one right triangle are congruent to the legs of another right triangle, the triangles are congruent. (LL Theorem)

3. If two angles and a not-included side of one triangle are congruent to the corresponding parts of another triangle, the triangles are congruent. (AAS Theorem)

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will answer true-false, multiple choice, and completion type questions pertaining to relationships concerning parallelograms, rectangles, rhombuses, squares, and trapezoids. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	The student will classify given relationships pertaining to parallelograms, rectangles, rhombuses, squares, and trapezoids as true or false.		For each of the statements below, indicate whether it is true or false.
		7.1.1	A rectangle is a trapezoid.
		7.1.2	A rhombus is a square.
		7.1.3	A square is a parallelogram.
		7.1.4	A rectangle is a square.
		7.1.5	The diagonals of a rhombus bisect each other.
		7.1.6	The diagonals of a square are perpendicular to each other.

COURSE GEOMETRY

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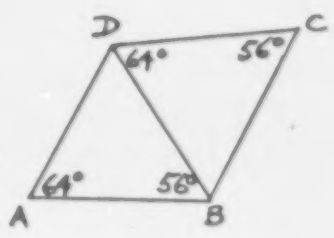
TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will apply theorems of inequalities for one or two triangles* and work appropriate problems. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	The student will apply theorems of inequality for one triangle* to work appropriate problems.	8.1.1	Which of the following could be used as the lengths of the sides of a triangle? a. 10, 11, 12 b. 3, 4, 5 c. 1, 2, 3
		8.1.2	Name the smallest angle of $\triangle RST$ if RS = 12, RT = 14, and ST = 11.
		8.1.3	Name the longest side of $\triangle WXZ$ if $m\angle W = 70$, $m\angle Z = 62$, and $m\angle X = 48$.
		8.1.4	Name the shortest and longest sides of the quadrilateral shown below.



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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and tehorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.2	The student will apply theorems of inequality for two triangles* to work appropriate problems.	8.2.1	In the plane figure, AB = 10, BC = 9, CD = 11. Compare the measures of angles 1, 2, and 3.
		8.2.2	In the plane figure m∠1 = 100, m∠2 = 90, m∠3 = 102. Compare the lengths AB, BC, CD, and DA.

Inequalities

Theorems:

1. If two sides of a triangle are not congruent, then the angles opposite those sides are not congruent and the angle opposite the longer side is the larger.

2. If two angles of a triangle are not congruent, then the sides opposite those angles are not congruent and the side opposite the larger angle is the longer side.

3. The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

4. If two sides of one triangle are congruent to two sides of another triangle, but the included angle of the first triangle is larger than the included angle of the second, then the third side of the first triangle is longer than the third side of the second.

5. If two sides of one triangle are congruent to two sides of another triangle, but the third side of the first triangle is longer than the third side of the second, then the included angle of the first triangle is larger than the included angle of the second.

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Ratio and proportion

T.P.O. Given problems involving similar polygons, the student will solve for specified information. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	The student will solve problems relating to ratio and proportions.	9.1.1	Two supplementary angles have measures in the ratio 5:7. State the measure of the larger angle.
		9.1.2	The numbers r, s, and t are in the ratio 4:5:7. State the ratio of s:t.
		9.1.3	Given: $8x = 3y$. State the value of the ratio of x to y.
		9.1.4	Point T lies on $\overline{DF}$. DT = 4 and TF = 9. State the values of the following ratios.

a. DT : TF

b. TF : DT

c. TF : DF

d. (TF - DT) : DT

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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Ratio and proportion

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		9.1.5	Solve each proportion for x: a. $\frac{2}{7} = \frac{x}{3}$ b. $\frac{4}{x+3} = \frac{2}{3}$
9.2	Given problems involving similar polygons, the student will solve for the specified information.	9.2.1	Two quadrilaterals are similar. The side of the smaller quadrilateral have lengths 4, 5, 6 and 8. The shortest side of the larger quadrilateral is 6 units long. a. State the length of the longest side of the larger quadrilateral. b. State the perimeter of the larger quadrilateral.
		9.2.2	A rectangular-shaped snapshot has dimensions 2 1/2 in. and 1 1/2 in. It is to be enlarged so that the longer dimension will be 10 in. What will the perimeter of the enlarged picture be?

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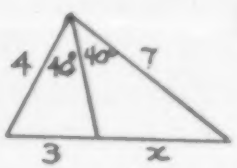
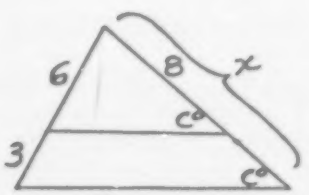
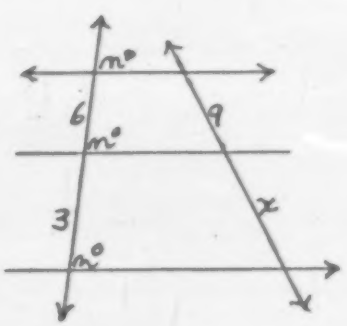
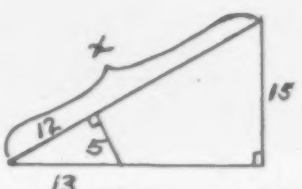
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Ratio and proportion

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.3	Given problems involving special segments in a triangle, the student will solve for the required information.	9.3	In each of the following, find the length x:
		9.3.1	
		9.3.2	
		9.3.3	
		9.3.4	

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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. The student will apply the Pythagorean Theorem to find specified information relating to right triangles. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.1	The student will apply the Pythagorean Theorem to find specified information relating to right triangles.	10.1 .1	In $\triangle XYZ$, $m\angle Y = 90$. a. If XY = 8 and YZ = 6, then XZ = ? b. If XZ = 17 and XY = 15, then YZ = ?
		10.1 .2	Find the length of a diagonal of a square whose side has length 6 cm..
		10.1 .3	Find the length of a side of a square whose diagonal has length 4 cm.
		10.1 .4	A man walks 7 mi. due north, 6 mi. due east and then 4 mi. due north. How far is he from his starting point?

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.2	The student will use the properties of special right triangles (30°-60°-90°), (45°-45°-90°) and solve for required information.	10.2 .1	Find the length of the hypotenuse of an isosceles right triangle whose legs each have length 8 in.
		10.2 .2	Find the length of the altitude of an equilateral triangle whose side has length 8 cm.
		10.2 .3	Find the length of a side of an equilateral triangle whose altitude has length 12 m.
		10.2 .4	Express the perimeter of trapezoid ABCD in simplest form.

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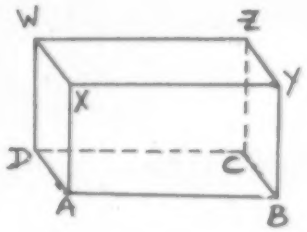
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.3	The student will apply the Pythagorean Theorem and solve for specified information in three dimensional figures.	10.3 .1	In the rectangular solid shown, AB = 10, BC = 6, and ZC = 4. State the following lengths:  a. WZ b. ED c. AC d. WB

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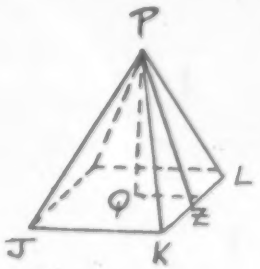
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		10.3 .2	PQ is the altitude of the regular square pyramid shown. $\overline{PZ} \perp \overline{KL}$. PJ = 13 and JK = 10. State the following lengths.



a. KL

b. KZ

c. PZ

d. PQ

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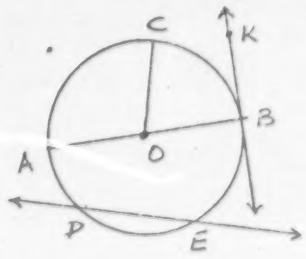
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O. Given problems involving angles and segments which are related to circles, the student will solve for the required information. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	Given a plane figure consisting of a circle together with appropriate rays, line, segments, the student will identify the radius, chord, secant, tangent line, and diameter of the circle.	11.1 .1	In the plane figure shown, name:  1. a radius 2. a chord that is not a diameter 3. a secant 4. a tangent line

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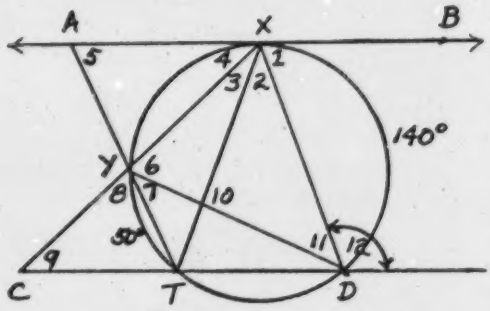
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.2	Given problems involving angles which are related to circles, the student will solve for the required information.	11.2	Given: $\overleftrightarrow{AB}$ tangent at X. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$; $m\overset{\frown}{XD} = 140$; $m\overset{\frown}{YT} = 50$
			
		11.2 .1	$m\angle 1 =$
		11.2 .2	$m\angle 2 =$
		11.2 .3	$m\angle 3 =$
		11.2 .4	$m\angle 4 =$
		11.2 .5	$m\angle 5 =$
		11.2 .6	$m\angle 6 =$

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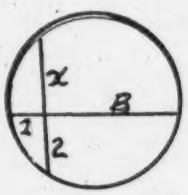
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		11.2 .7	m∠7 =
		11.2 .8	m∠8 =
		11.2 .9	m∠9 =
		11.2 .10	m∠10 =
		11.2 .11	m∠11 =
		11.2 .12	m∠12 =
11.3	Given problems involving segments which are related to circles, the student will solve for the required information.	11.3	Using the figures with chords, secants, and tangents shown, state the value of x.
		11.3 .1	

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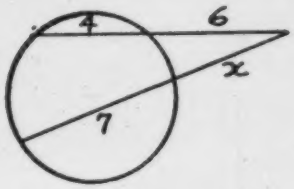
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON:

Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		11.3 .2	
		11.3 .3	

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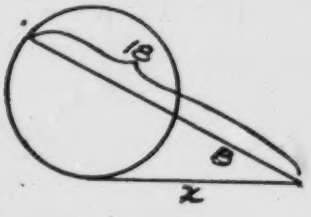
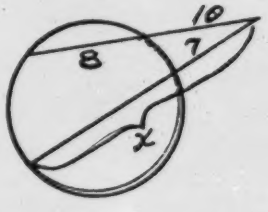
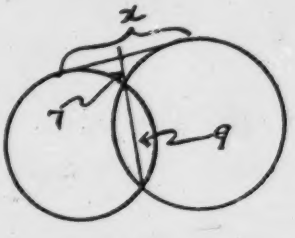
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Geometric postulates and theorems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		11.3 .4	
		11.3 .5	
		11.3 .6	

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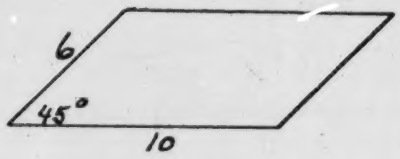
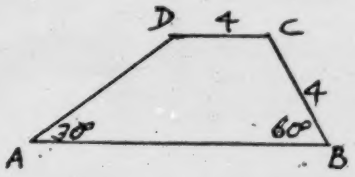
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Areas and Volumes

T.P.O. Given the appropriate information, the student will find:

A. Areas of polygons and circles;
B. Areas and volumes of solids.
70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.1	Given problems relating to the areas of polygons, the student will solve for the required information.	12.1 .1	Find the area of a rectangle of perimeter 16 inches and width 2 inches.
		12.1 .2	The sides of two square have the ratio of 2:3. What is the ratio of the areas of the two squares?
		12.1 .3	Find the area of an equilateral triangle with a side of 3 feet.
		12.1 .4	Find the area of the parallelogram shown below. 
		12.1 .5	Find the area of trapezoid ABCD. 
		12.1 .6	Find the area of a 30°-60°-90° triangle in which the shorter leg is 4 inches.

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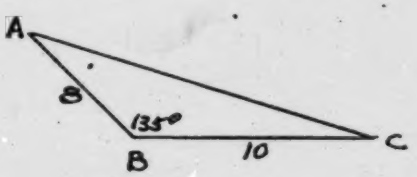
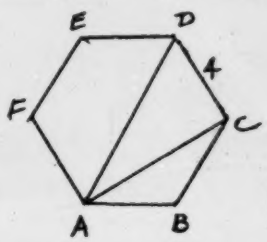
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Areas and Volumes

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		12.1 .7	Find the area of △ABC. 
		12.1 .8	The diagonals of a parallelogram are 8 inches and 12 inches. Find the area of the parallelogram if the diagonals intersect at 30°.
		12.1 .9	The shortest sides of two similar pentagons are 6 inches and 9 inches. If the area of the smaller pentagon is 24 square inches, find the area of the larger pentagon.
		12.1 .10	Find the area of a square whose radius is 6 inches.
		12.1 .11	Find the area of an equilateral triangle circumscribed about a circle of radius 4 inches.
		12.1 .12	In the regular hexagon ABCDEF shown below, find the area of △AED if ED = 4 inches. 

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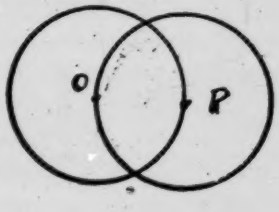
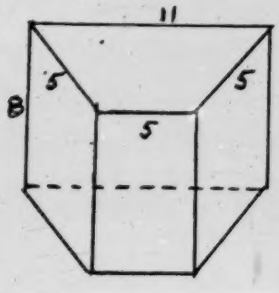
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Areas and volumes

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.2	Given problems relating to the areas of circles, the student will solve for the required information.	12.2 .1	Find the area of the region between two concentric circles of radii 9 and 6.
		12.2 .2	In the figure shown, circles O and P each have a radius of 6. Find the area of the shaded region. 
12.3	Given problems relating to the area and volume of solids, the student will solve for the required information.	12.3 .1	Find the total area of a cube whose edge is 3 inches.
		12.3 .2	Find the volume of a right prism with a height of 6 inches and a square base of side 4 inches.
		12.3 .3	A cube has a lateral area of 100 square inches. Find the volume of the cube.
		12.3 .4	Find the volume of the right prism shown below in which the bases are isosceles trapezoids. 

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Areas and Volumes

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		12.3 .5	Find the volume of a sphere which has a radius of 3 inches.
		12.3 .6	Find the total area of a cylinder inscribed in a cube of edge 6.
		12.3 .7	A right triangle with legs 3 and 4 is rotated about the shorter leg. Find the volume of the cone generated (formed).
		12.3 .8	A cone of altitude 8 is inscribed in a sphere of radius 5. Find the volume of the cone.
		12.3 .9	The ratio of the volume of two cubes is 8:27. Find the ratio of their total areas.
		12.3 .10	If a ball 2 inches in diameter weighs 8 pounds, what would be the weight of a ball of the same material 6 inches in diameter?

COURSE GEOMETRY

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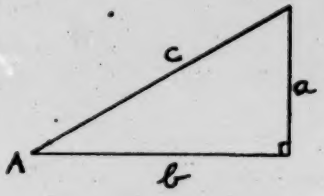
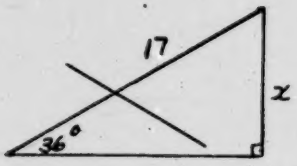
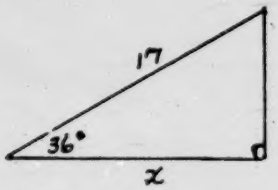
TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Right triangle trigonometry

T.P.O. Given problems involving right triangle trigonometry, the student will solve the problems, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.1	The student will define the sine, cosine, and tangent ratios in terms of the sides of a given right triangle.	13.1 .1	The sine, cosine, and tangent ratios are defined in terms of a, b, and c by:  1. sin A = 2. cos A = 3. tan A =
13.2	The student will write the equation used to solve given right triangles.	13.2 .1	State the equation you would use to determine the value of x. Do not solve the equation. 1.  2. 

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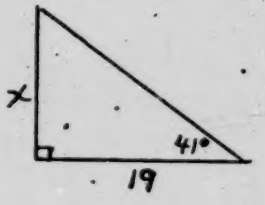
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Right triangle trigonometry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.2	Cont'd	13.2 .1	3.  4.
13.3	The student will find sin x, cos x, and tan x, when $x \in \{30°, 45°, 60°\}$.	13.3 .1	Find each of the following: 1. sin 30° = 2. cos 45° = 3. tan 45° = 4. sin 60° = 5. tan 60° = 6. sin 45° =

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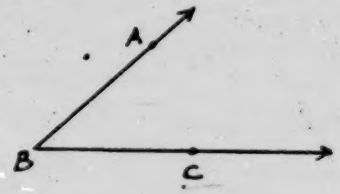
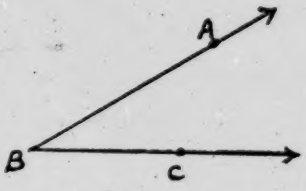
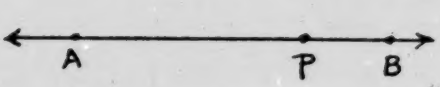
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric constructions

T.P.O. The student will complete basic construction activities with a compass and a straightedge, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.1	The student will, by construction, find an angle congruent to a given angle.	14.1 .1	1. Construct an angle whose measure equals $m\angle ABC$.  2. Construct an angle whose measure equals $2 \cdot m\angle ABC$. 
14.2	The student will, by construction, find the bisector of a given angle.	14.2 .1	1. Draw an acute angle and bisect it. 2. Draw an obtuse triangle and bisect each of its angles.
14.3	The student will, by construction, find a line perpendicular to a given line at a given point on the line.	14.3 .1	1. Construct a line $\perp \overleftrightarrow{AB}$ at point P. 

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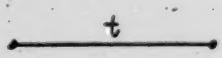
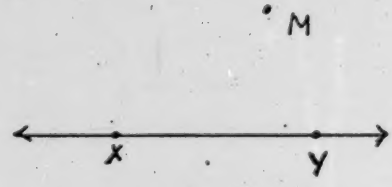
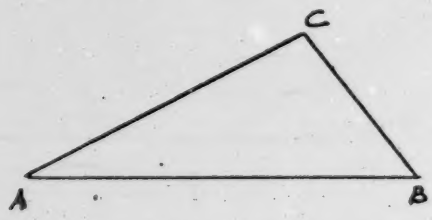
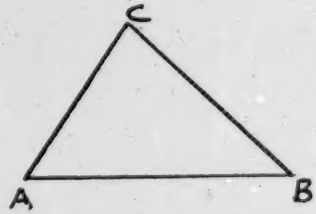
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric constructions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.3	Cont'd	14.3 .1	2. Construct a square with sides of given length t. 
14.4	The student will, by construction, find a line perpendicular to a given line from a given external point.	14.4 .1	1. Construct a line through M $\perp \overleftrightarrow{XY}$. 
			2. Construct the altitude to side $\overline{AC}$ of $\triangle ABC$. 
14.5	The student will, by construction, find the perpendicular bisector of a given segment.	14.5 .1	1. Construct the perpendicular bisector of the sides of $\triangle ABC$. 

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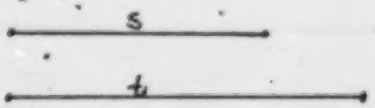
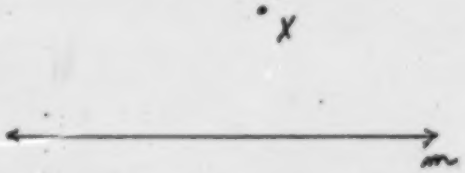
COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric constructions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.5	Cont'd	14.5 .1	2. Construct a rhombus given the lengths s and t of its unequal diagonals. 
14.6	The student will, by construction, find a line parallel to a given line through a given point not on the line.	14.6 .1	1. Through point X, construct a line parallel to line m. 
14.7	The student will, by construction, find a line that bisects a given arc of a circle.	14.7 .1	1. Locate the midpoint of $\overset{\frown}{AD}$.
			2. Given the circle shown below, by construction, find the center of the circle.

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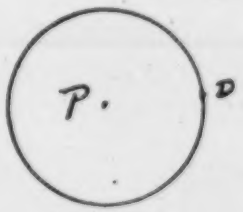
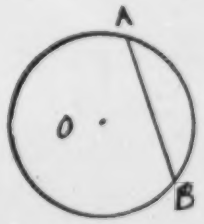
TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric construction

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.8	The student will, by construction, find a tangent to a given point on a circle.	14.8 .1	1. Construct a tangent to ⊙P at D.  2. Construct a tangent to ⊙O which will be parallel to AB. 
14.9	The student will, by construction, find a tangent to a circle from a given external point.	14.9 .1	1. Construct a tangent to ⊙P from B.

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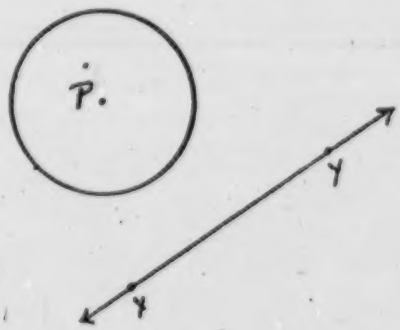
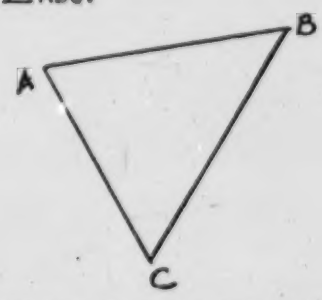
TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric constructions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.9	Cont'd	14.9	2. Construct a tangent to ⊙P parallel to $\overleftrightarrow{XY}$. 
14.10	The student will, by construction, circumscribe a circle about a given triangle.	14.10 .1	1. Circumscribe a circle about △ABC.  2. Construct a square. Then circumscribe a circle about it.

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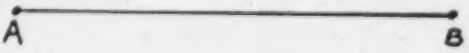
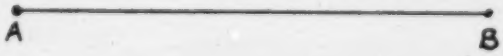
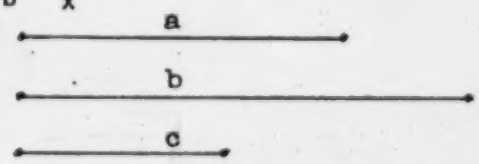
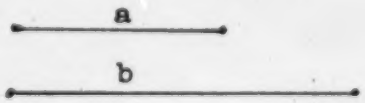
RMINAL PERFORMANCE
BJECTIVE NO. 14.0

SKILL/KNOWLEDGE BASED ON: Basic geometric constructions

P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.11	The student will, by construction, inscribe a circle in a given triangle.	14.11 .1	1. Draw an obtuse triangle. Inscribe a circle in the triangle. 2. Construct a right triangle. Inscribe a circle in the right triangle.
14.12	The student will, by construction, divide a segment into any number of congruent segments.	14.12 .1	1. Divide $\overline{AB}$ into three congruent segments.  2. Divide $\overline{AB}$ into five congruent segments. 
14.13	The student will, by construction, find a segment whose length is the fourth term of a proportion in which the first three terms are the lengths of three given segments.	14.13 .1	1. Given segments of lengths shown. Construct a segment x such that: $\frac{a}{b} = \frac{c}{x}$ 
14.14	The student will, by construction, find a segment whose length is the geometric mean between the lengths of two given segments.	14.14 .1	1. Given segments of lengths shown. Construct a segment x such that $x = \sqrt{ab}$. 

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TERMINAL PERFORMANCE OBJECTIVE NO. 15.0

SKILL/KNOWLEDGE BASED ON: Coordinate geometry

T.P.O. Given appropriate problems of geometric content, the student will solve these problems by use of coordinate geometry, with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
15.1	The student will graph, in the coordinate plane, stated conditions.	T5.1 .1	Draw the graphs, in the coordinate plane, of the conditions stated. 1. $\{(x, y): x = 2\}$ 2. $\{(x, y): y > -3\}$ 3. $\{(x, y): \lvert x\rvert = 1\}$ 4. $\{(x, y): y + 1 = 4\}$ 5. $\{(x, y): x = 2\} \cup \{(x, y): y > -1\}$ 6. $\{(x, y): x < 2\} \cap \{(x, y): y \geq 2\}$
15.2	The student will apply the distance formula and find: A. the distance between two specified points B. the coordinates of the center and the length of the radius of circles whose equations are given C. the midpoints of segments joining points named	15.2 .1	Questions 1 - 2, find the distance between the specified points. 1. (0, -2) and (4, -5) 2. (m, n) and (g, h) 3. The vertices of a parallelogram are points (1, -2), (5, -2), (6, 1), and (2, 1). Show that the diagonals are not congruent. Questions 4 - 6, find the radius and the center of each circle. 4. $x^2 + (y - 2)^2 = 16$ 5. $(x + 2)^2 + (y - 3)^2 = 2$ 6. $x^2 - 4x + y^2 + 8y - 5 = 0$

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COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0

SKILL/KNOWLEDGE BASED ON: Coordinate geometry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
15.2	Cont'd	15.2 .1	Questions 7 - 8, find the midpoint of the segment joining the points named. 7. $(-1, \frac{1}{2})$ and $(-4, 3\frac{1}{2})$ 8. (a, b) and (c, d)
15.3	The student will write equations for lines satisfying appropriate given conditions,	15.3 .1	Questions 1 - 3, state the equation of the line passing through P and having slope m. 1. m = -4; P(2, 0) 2. $m = \frac{5}{3}$; P(1, 3) 3. m = 0; P(-2, -3) Questions 4 - 6, state the equation of the line containing the points: 4. (1, 2) and (6, 5) 5. (-4, 0) and (2, -1) 6. (0, 0) and (-3, 2) Questions 7 - 8, state the equation of the line: 7. Through point (2, -1) and parallel to a line that has slope $\frac{1}{2}$ 8. Through the midpoint of, and perpendicular to, the segment joining points (1, 0) and (5, -2).

COURSE GEOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 16.0

SKILL/KNOWLEDGE BASED ON: Vectors

T.P.O. The student will demonstrate that he can use vectors to find the solutions to simple analytic problems.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
16.1	The student will find the sum of given vectors.	16.1 .1	1. Use the definition of the sum of two vectors to find the following sums: a. (2, 3) + (4, 1) b. (-1, 0) - (3, -2) c. (t, q) + (r, s) 2. Use the coordinate axes and a geometric drawing to represent the following sums: a. (2, 3) + (4, 1) b. (2, 0) + (0, -4)
16.2	The student will find the components of a vector that is the product of a vector by a scalar.	16.2 .1	Find the components of the vector that is the product of the vector by the scalar: 1. 2(3, 4) 2. $\frac{1}{2}(6, -5)$ 3. -3(-1, 1)
16.3	The student will find the magnitude of given vectors.	16.3 .1	Determine the magnitude of each of the following vectors: 1. (2, 0) 2. (-3, 4) 3. (-2, $-2\sqrt{3}$) 4. ($\sqrt{3}$, 1)

COURSE GEOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 16.0

SKILL/KNOWLEDGE BASED ON: Vectors

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
16.4	The student will relate vector problems from appropriate word problems and solve them.	16.4 .1	Solve graphically: 1. A man walks three miles northeast and two miles directly north. What is his final position with respect to his starting point? 2. Two 20-pound forces act on an object at a 50° angle to each other. What is the magnitude of the resultant force? 3. Three forces act on an object. The first two forces, of 30 and 40 pounds, are directed at a 90° angle with respect to each other. The third force, of 60 pounds, is directed at an 80° angle to the 30-pound force and a 10° angle to the 40-pound force. Find the magnitude of the resultant force.

TRIGONOMETRY

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Measure functions

T.P.O. Given various "measure" functions, the student will demonstrate a knowledge of measurement by: (a) Finding the distance between two points whose coordinates are given. (b) Expressing in radians measures of angles given in degrees, and expressing in degrees measures of angles given in radians. (c) Finding the two sides of a 30-60-90, and/or 45-45-90 triangle when given the measure of one side. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	The student will find the distance between two points whose coordinates are given.	1.1	Find the distance between the points listed: 1. (0, 0); (3, 4) 2. ($\sqrt{2}$, 5); ($5\sqrt{2}$, 7)
1.2	The student will express in radians measure of angles given in degrees.	1.2	Express in radian measure: 1. 45° 2. 4° 3. x°
1.3	The student will express in degrees measures of angles given in radians.	1.3	Express in degree measure: 1. π^R 2. $\frac{\pi}{4}^R$ 3. $x\pi^R$
1.4	Given the measure of one of the sides of a 30-60-90 triangle, the student will find the measures of the other two sides.	1.4	Find the length of the hypotenuse of a 30-60-90 triangle whose shorter leg has a length: 1. 8 2. $2\sqrt{3}$

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: Measure Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		1.4	Find the length of the hypotenuse of a 30-60-90 triangle whose longer leg has length: 3. $10\sqrt{3}$ 4. t Find the length of the altitude of an equilateral triangle whose side has length: 5. 6 6. $2\sqrt{3}$
1.5	Given the measure of one of the sides of a 45-45-90 triangle, the student will find the measure of the other two sides.	1.5	Find the length of the hypotenuse of an isosceles right triangle whose legs have length: 1. 6 2. $3\sqrt{2}$ Find the length of a leg of an isosceles right triangle whose hypotenuse has length: 3. 12 4. $10a\sqrt{2}$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O. Given basic trigometric circular functions, the student will demonstrate understanding of these functions by: (a) Answering questions related to the unit circle. (b) Solving selected equations relating to the sine and cosine functions. (c) Verfying selected identities relating to the sine and cosine functions. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	The student will state the equation of the unit circle with center at the origin.	2.1	1. State the equation of the unit circle with center at the origin.
2.2	Given a point at a given distance on the unit circle from P(1, 0), the student will name the quadrant in which the point lies.	2.2	If T is a point that is at the given distance on the unit circle from P(1, 0), name the quadrant in which T lies. 1. $\frac{1}{4}\pi$ 2. 5 3. $4\pi + \frac{1}{3}\pi$ 4. $\frac{1}{5}\pi + 2k\pi$ ($k \in$ {integers})
2.3	Given a distance from P(1,0) to a point along the unit circle, the student will determine the coordinates of the point.	2.3	If on the unit circle the distance from P(1, 0) to a point $T(\frac{3}{5}, \frac{4}{5})$ is x, determine the coordinates of the points with the following distances on the unit circle from P. 1. $\pi - x$ 2. $\pi + x$ 3. $2\pi + x$ 4. $-x$ 5. $4\pi + x$ 6. $3\pi - x$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.4	The student will express the cosine or sine of a given number in terms of the cosine or sine of x, where $0 \leq x \leq 2\pi$.	2.4	Express each of the following as the cosine or sine, as the case may be, of a number x, where $0 \leq x \leq 2\pi$. 1. $\sin 18\pi$ 2. $\cos(-\pi)$ 3. $\sin\left(-\frac{\pi}{2}\right)$ 4. $\cos 27\pi$ 5. $\sin 231\pi$
2.5	The student will use the relationship $\sin^2 x + \cos^2 x = 1$ to find values for sin x where cos x and the quadrant are given.	2.5	Use the relationship $\sin^2 x + \cos^2 x = 1$ to find values for sin x when cos x and the quadrant are as given. 1. $\cos x = \frac{\sqrt{2}}{2}$, first quadrant 2. $\cos x = -\frac{1}{2}$, second quadrant 3. $\cos x = -\frac{\sqrt{3}}{2}$, third quadrant 4. $\cos x = \frac{\sqrt{2}}{2}$, fourth quadrant

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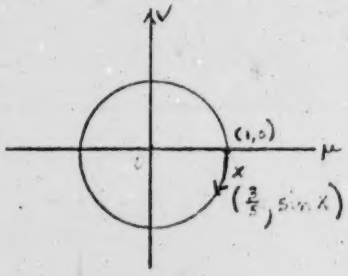
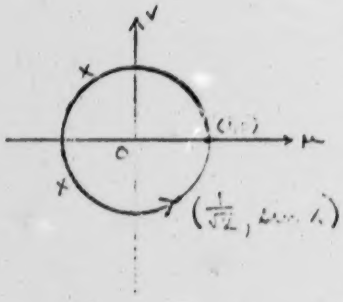
COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		2.5	Find sin x: 5.  6. 

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TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.6	The student will supply the values of cos x and sin x for special values of x.	2.6	Evaluate cos x and sin x for the indicated values of x: 1. 0 2. $\frac{\pi}{3}$ 3. $\frac{5}{6}\pi$ 4. $\frac{11}{6}\pi$ 5. 3π 6. -11π 7. $\frac{21}{4}\pi$ 8. $-\frac{82}{3}\pi$ 9. 100π 10. $\frac{108}{8}$
2.7	Given statements relating sin x and cos x, the student will use the symmetry of the unit circle to test whether the statements are true for all $x \in R$.	2.7	Use the symmetry of the circle to test whether the given statement is true for every $x \in R$. 1. $\sin x = \cos x$ 2. $\cos x = \cos(-x)$

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TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		2.7	3. $\sin(\pi - x) = \sin x$
			4. $\sin(\frac{\pi}{2} - x) = \cos x$
			5. $\sin x = \sin(-x)$
			6. $\cos(\pi + x) = \cos x$

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TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Circular Functions

T.P.O. Upon the completion of a study of additional circular functions, the student will, on a written exam: (a) List tan x, cot x, sec x, and csc x for special values of x. (b) Prove selected identities. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	Using the definition of tan, cot, sec, and csc, the student will find tan x, cot x, sec x, and csc x for special values of x.	3.1	1. $\sec 0 =$ 2. $\csc \frac{\pi}{6} =$ 3. $\tan \frac{3}{4}\pi =$ 4. $\cot (-\frac{\pi}{4}) =$ 5. $\sec \frac{\pi}{3} =$ 6. Find tan x when $\sin x = \frac{4}{5}$ and $\cos x > 0$. 7. Find sec x when $\sin x = -\frac{3}{5}$ and $\cos x > 0$. 8. Find cot x when $\sin x = \frac{5}{13}$ and $\cos x < 0$.
3.2	The student will prove selected circular function identities.	3.2	Prove the identities: 1. $\cot^2 t + 1 = \csc^2 t$ 2. $1 - 2\cos^2 x = 2\sin^2 x - 1$ 3. $\tan x \sin x = \sec x - \cos x$ 4. $\frac{\sin^2 x}{1 - \cos x} = 1 + \cos x$

COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Trigonometric Functions

T.P.O. Given selected trigonometric functions, the student will demonstrate an understanding of these functions by: (a) Writing the values of the six trigonometric functions of an angle when given the rectangular coordinates of a point on the terminal side of the angle in standard position. (b) Solving selected equations relating to the trigonometric functions. (c) Providing selected identities relationg to the trigonometric functions. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	Given the rectangular coordinates of a point on the terminal side of an angle in standard position, the student will write the values of the six trigonometric functions of the angle.	4.1	Given the rectangular coordinates of a point on the terminal side of angle θ in standard position. Find the values of all the trigonometric functions that are defined for θ. 1. (3, 4) 2. $(-1, -\sqrt{3})$
4.2	Given the quadrant in which the terminal side of an angle lies and the value of one of the trigonometric functions of the angle, the student will find the value of the other five functions.	4.2	Given the quadrant in which angle θ lies and the value of one of the trigonometric functions of θ, find the value of the other five functions. 3. II; $\tan \theta = -1$ 4. IV; $\csc \theta = -2$ 5. II; $\cos \theta = -\frac{7}{10}$
4.3	The student will find $\sin \theta$, $\cos \theta$, $\tan \theta$, $\cot \theta$, $\sec \theta$, and $\csc \theta$ for special values of θ.	4.3	1. $\sin 45°$ 2. $\cos 30°$ 3. $\tan 60°$ 4. $\cot 45°$ 5. $\sec 135°$ 6. $\csc 60°$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Trigonometric Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.4	The student will prove selected trigonometric identities.	4.4	Prove the identities: 1. $\tan\theta = \frac{\sec\theta}{\csc\theta}$ 2. $\sin^2\theta\,(1 + \cot^2\theta) = 1$ 3. $(\csc\theta - \cot\theta)(\csc\theta + \cot\theta) = 1$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Multiple Angle Formulas

T.P.O. Given the multiple-angle formulas, the student will demonstrate an understanding of the formulas by: (a) Solving selected trigonometric equations. (b) Proving that selected equations are identities. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	Given the sum, difference, double- and half-angle formulas for circular and trigonometric functions, the student will solve selected equations.	5.1	$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$ $\cos 2A = \cos^2 A - \sin^2 A$ $\sin 2A = 2 \sin A \cos A$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$ $\left\lvert \sin \frac{A}{2} \right\rvert = \sqrt{\frac{1 - \cos A}{2}}$ $\left\lvert \cos \frac{A}{2} \right\rvert = \sqrt{\frac{1 + \cos A}{2}}$ $\left\lvert \tan \frac{A}{2} \right\rvert = \sqrt{\frac{1 - \cos A}{1 + \cos A}}$ $(\cos A \neq -1)$ Using the formulas above, determine the values of each of the following numbers: 1. $\cos 75°$ 2. $\sin 15°$ 3. $\tan \frac{7\pi}{15}$ 4. $\csc 75°$ 5. $\cos\left(-\frac{\pi}{12}\right)$

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TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Multiple Angle Formulas

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.2	Given the sum, difference, double- and half-angle formulas for circular and trigonometric functions, the student will prove that selected equations are identities.	5.2	Given the formulas as shown in 5.1 Prove each of the following identities: 1. $\sin (A + B) + \sin (A - B) = 2\sin A \cos B$ 2. $\cot (180° - \theta) = -\cot \theta$ 3. $\sin^2 A - \sin^2 B = \sin (A + B) \cdot \sin (A - B)$ 4. $\tan (90° - \theta) = \cot \theta$ 5. $\sin (\pi - x) - \sin x$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Trigonometric Functions

T.P.O. Given a rectangular coordinate system with axes labeled, the student will sketch the graphs of the sine, cosine, tangent, cotangent, secant, and cosecant functions with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	The student will, on a written exam, state the domain and range of the sine, cosine, tangent, cotangent, secant, and cosecant functions.	6.1	1. State the domain and range for the sine function. 2. State the domain and range for the cosine function. 3. State the domain and range for the tangent function. 4. State the domain and range for the cotangent function. 5. State the domain and range for the secant function. 6. State the domain and range for the cosecant function.
6.2	The student will sketch the graph of the function $\{(x, y): y = A \sin (Bx + C)$, where $A \neq 0$ and $B \neq 0\}$	6.2	Sketch the graph of the following functions: 1. $\{(x, y): y = 2 \sin x\}$ 2. $\{(x, y): y = \sin (x + \frac{\pi}{2})\}$ 3. $\{(x, y): y = -3\sin (6x - \quad)\}$ 4. $\{(x, y): y = 2 + \sin (x - \frac{\pi}{4})\}$

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TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Trigonometric Functions

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.3	The student will sketch the graph of the function $\{(x, y): y = A \cos (Bx + C)$ where $A \neq 0$ and $B \neq 0\}$	6.3	Sketch the graph of the following functions: 1. $\{(x, y): y = \cos \frac{1}{2}x\}$ 2. $\{(x, y): y = 4\cos 4x\}$ 3. $\{(x, y): y = 3\cos (x - \frac{\pi}{2})\}$ 4. $\{(x, y): y - 1 = 2 \cos (x + \frac{\pi}{2})\}$
6.4	The student will sketch the graph of the function $\{(x, y): y = A \tan (Bx + C)$ where $A \neq 0$ and $B \neq 0\}$	6.4	Graph each of the following: 1. $\{(x, y): y = 3 \tan x\}$ 2. $\{(x, y): y = \tan (x + \frac{\pi}{3})\}$
6.5	The student will sketch the graph of the function $\{(x, y): y = A \cot(Bx + C)$ where $A \neq 0$ and $B \neq 0\}$	6.5	Graph each of the following: 1. $\{(x, y): y = \cot 2x\}$ 2. $\{(x, y): y = \cot(x - \frac{\pi}{4})\}$
6.6	The student will sketch the graph of the function $\{(x, y): y = A \sec(Bx + C)$ where $A \neq 0$ and $B \neq 0\}$	6.6	Graph each of the following: 1. $\{(x, y): y = 3 \sec x\}$ 2. $\{(x, y): y = \sec(x - \overline{6})\}$
6.7	The student will sketch the graph of the function $(x, y): y = A \csc (Bx + C)$ where $A \neq 0$ and $B \neq 0$	6.7	Graph each of the following: 1. $\{(x, y): y = -\csc \frac{1}{2}x\}$ 2. $\{(x, y): y = \csc(x + \overline{3})\}$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: Inverses of Circular Functions

T.P.O. Upon completion of a study of the inverses of circular functions, the student will, on a written examination: (a) List the domain and range of each of the six inverse circular functions. (b) Solve open sentences involving values of circular or trigonometric functions. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	The student will, on a written exam, list the domain and range of each of the six inverse circular functions.	7.1	1. State the domain and range of Arc sin. 2. State the domain and range of Arc cos. 3. State the domain and range of Arc tan. 4. State the domain and range of Arc cot. 5. State the domain and range of Arc sec. 6. State the domain and range of Arc csc.
7.2	Given open sentences involving values of circular or trigonometric functions the student will find the solution sets.	7.2	Solve for x, using inverse notation when necessary: 1. $5 \cos x = 1$ 2. $\sin 2x = 3 \cos x$ 3. $\tan^2 x - 5 = 0$ 4. $\cos 2x + 3 \cos x = 1$ 5. $\sin (\pi + x) = 2$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: • Reference Angles

T.P.O. The student will demonstrate understanding of the use of reference angles and tables for circular of trigonometric functions by finding values for specified circular or trigonometric functions. 70% accuracy required.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	The student will state the measure of the reference angle associated with each angle whose measures are given.	8.1	State the measure of the reference angle associated with each of the angles whose measures are given: 1. 217° 2. -211° 3. 1332° 4. -1700°
8.2	The student will find values for specified circular or trigonometric functions by using tables for circular or trigonometric functions as needed.	8.2	Find each of the following, using the tables given as needed. 1. cot 72°43' 2. sin 21°36' 3. sec 0.991 4. cot 1.490
8.3	Given the values of specified trigonometric functions, the student will find the least positive measure of each angle to the nearest minute by use of tables for trigonometric functions.	8.3	Find the least positive measure of each angle to the nearest minute: 1. tan θ = 3.106 2. sec θ = 2.715 3. sin θ = 0.1937

COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Right and Oblique Triangles

T.P.O. Given right and oblique triangles, the student will solve for the unknown parts of these triangles with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	The student will solve given right triangles.	9.1	1. In right $\triangle$ ABC, with right angle at C and a = 40, $\angle$ A = 71°. Find $\angle$ B, b and c. 2. In right $\triangle$ ABC, with right angle at C and $\angle$ A = 25°, c = 50. Find a, b and $\angle$ B. 3. In right $\triangle$ ABC, with right angle at C and a = 25, b = 7. Find $\angle$ A, $\angle$ B, and c. 4. A vertical utility pole is braced by a wire 20.1 feet from level ground. Find the length of the wire if it forms an angle of 17°20' with the vertical.
9.2	The student will solve given oblique triangles.	9.2	1. In oblique triangle ABC a = 8, b = 6 and C = 60°. Find $\angle$A, $\angle$B, and c. 2. In oblique triangle ABC, a = 640, $\angle$A = 70°, and $\angle$B = 52°. Find c, b, and $\angle$C. 3. Two fire lookout towers are located 7 miles apart along a mountain ridge. If tower A is directly north of tower B, and a fire is spotted bearing 265° from tower B and 250° from tower A, how far is the fire from tower B?

COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Right and Oblique Triangles

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		9.4	4. A parallelogram had adjacent sides of length 8 inches and 10 inches, and the measure of one included angle is 35°. Find the length of each diagonal of the parallelogram.

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Applications of Trigonometry

T.P.O. Given verbal problems which lend themselves to the use of trigonometric functions, the student will demonstrate his knowledge of the application of trigonometry by solving the problems with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.1	The student will solve appropriate uniform circular motion problems which lend themselves to trigonometric functions.	10.1	1. Let P move with constant speed in a counterclockwise direction around the unit circle starting at (1, 0), and let P complete $\frac{4}{3}$ revolutions per second. (a) Find the value of the rotational velocity. (b) Find the coordinates of P after 2 seconds. 2. A wheel of diameter 8 inches turns at a constant rate of 160 revolutions per minute. What is the rotational velocity of the wheel? If the wheel rolls along the ground without slipping, how far will it roll in 3 minutes.
10.2	The student will solve simple harmonic motion problems which lend themselves to trigonometric functions.	10.2	1. A 60-cycle-per-second generator produces a voltage in accordance with the relationship $E = E_{max}\sin(Wt + b)$, $-\frac{\pi}{2} \leq b \leq \frac{\pi}{2}$ If $E = E_{max}$ when $t = \frac{\pi}{2}$, and $E_{max} = 150$ volts, what is the voltage when $t = \frac{1}{80}$?

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: Applications of Trigonometry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		10.2	2. A particle is in simple harmonic motion, passing back and forth through the origin an equal distance in each direction. Its period is 2π, and when $t = 0$ it is located at its maximum distance from the origin, 4 units. Find an equation describing its its distance y from the origin in terms of t.,

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Vectors

T.P.O. Given verbal problems which lend themselves to the use of vectors, the student will solve them with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	The student will find the norm and direction angle of given vectors.	11.1	Find the norm and the direction angle of each of the given vectors: 1. $(-2, -2)$ 2. $(\sqrt{3}, -1)$
11.2	The student will perform the two basic operations: a) vector addition, and b) multiplication of a vector by a scalar on a given set of vectors and scalars.	11.2	Let $\vec{v} = (2, 3)$, $\vec{s} = (-2, -1)$, $c = 2$, $d = -1$. Find: 1. $\vec{v} - \vec{s}$ 2. $c\vec{v} - d\vec{s}$
11.3	The student will find the inner product of two given vectors.	11.3	Find each inner product: 1. $(3, 2) \cdot (5, -1)$ 2. $(\sqrt{2}, 5) \cdot (\sqrt{2}, -3)$
11.4	The student will determine whether given pairs of vectors are parallel, perpendicular, or neither.	11.4	Determine whether the vectors in each pair are parrallel, perpendicular, or neither: 1. $(3, -5)$; $(4, -\frac{20}{3})$ 2. $(4, 6)$; $(-2, 3)$ 3. $(\sqrt{3}, -2)$; $(6, -4\sqrt{3})$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Vectors

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.5	The student will resolve a given vector into a linear combination of $\vec{i} = (1, 0)$ and $\vec{j} = (0, 1)$.	11.5	Resolve each of the following into a linear combination of $\vec{i} = (1, 0)$ and $\vec{j} = (0, 1)$. 1. $(5, -2)$ 2. $(-2, \sqrt{5})$ 3. A vector with norm 3 and direction angle 60°.
11.6	The student will solve word problems which lend themselves to the use of vectors.	11.6	1. A weight of 800 pounds is on an inclined plane making a 16° angle with the horizontal. Find the components of the weight normal to the plane and parallel to the plane. 2. A 100-pound weight is suspended by two ropes making angles of 30° and 45° , respectively, with the vertical. In pounds, what is the tension in each rope? 3. An airplane flies on a compass heading of 90° at 200 miles per hour. The wind affecting the plane is blowing from 300° at 30 miles per hour. What is the true course and ground speed of the airplane?

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: Polar Coordinates

T.P.O. Given Cartesian and polar coordinates, the student will express Cartesian coordinates in terms of polar coordinates and vice versas with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.1	The student will express given Cartesian coordinates as polar coordinates.	12.1	Find polar coordinates for each point with the given Cartesian coordinates: 1. (2, 2) 2. $(-2, -\sqrt{3})$
12.2	The student will express given polar coordinates as Cartesian coordinates.	12.2	Find Cartesian coordinates for each point with the given polar coordinates: 1. $(3, -30°)$ 2. $(2, \frac{3\pi}{4}^R)$

COURSE TRIGONOMETRY

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TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Complex Numbers

T.P.O. Given complex numbers, the student will demonstrate his knowledge of these numbers by: (a) Performing the four basic operations on given complex numbers, and (b) Raising given complex numbers to specified rational powers with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.1	The student will perform the four basic operations on given complex numbers and express the results in standard form.	13.1	If $z_1 = 3 + 2i$, $z_2 = 5 - 3i$; Find, in the form $x + yi$, with $x, y \in R$: 1. $z_1 + z_2$ 2. $z_1 - z_2$ 3. $z_1 z_2$ 4. $\frac{z_1}{z_2}$
13.2	The student will change given complex numbers to polar form.	13.2	Change each of the following to polar form: 1. $-2 + 2i$ 2. $-1 - \sqrt{3}i$ 3. $6 - 3i$
13.3	The student will change given complex numbers in polar form to standard form.	13.3	Change each of the following to the form $x + yi$. 1. $3(\cos 60° + i \sin 60°)$ 2. $8[\cos(-60°) + i \sin(-60°)]$

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COURSE TRIGONOMETRY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Complex Numbers

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.4	The student will perform the operations of multiplication and division on complex numbers in polar form.	13.4	Find an expression of the form $r(\cos\theta + i\sin\theta)$ for z_1z_2 and $\frac{z_1}{z_2}$, when z_1 and z_2 are as given: 1. $z_1 = 3(\cos 60° + i \sin 60°)$ $z_2 = 3(\cos 30° + i \sin 30°)$ 2. $z_1 = -2 + 2i$ $x_2 = -1 + i$
13.5	The student will express given complex numbers raised to specified rational powers in simplest form.	13.5	Simplify each of the following: 1. $[3(\cos 10° + i\sin 10°]^6$ 2. $(1 + \sqrt{3}\ i)^4$ 3. The three cube roots of 1.